August 1990 Vol. 3 Nº 11 Price £2.00

Archive

The Subscription Magazine for Archimedes Users

More New SCSI Devices

More about SoundTracker

Optimising 'C' Programs – Part 2

Using the PC Emulator – Part 4

Introduction to 'C' – Part 9

Reviews: Atomwide's 4 to 8Meg upgrade, Poster, Teletext Adaptor, Z88-Archimedes Link, Chess, Agenda Portable, ArcDFS, Herewith the Clues, Man at Arms.

No room! No room!

Archive was born in the front room of a largish semi-detached house in Norwich. Over the last three years it has grown (Archive, not the house) out of all proportion. It has now taken over two other rooms in the house (plus the kitchen, once a month, where our faithful team stuff the magazine into envelopes) and we have had to hire an industrial unit to store the boxes of back issues of Archive.

We have finally succumbed to the idea that we will have to move out and are in the process of buying new premises. The building we are trying to buy used to be a printworks. In fact, it is the printworks where the first two volumes of Archive were printed! We are not giving out the new address yet until the whole thing is finalised. The problem at the moment is to persuade the city planners to let us change the use of the property since the existing consent is specifically for a printworks. As soon as it is finalised, we will let you know where Archive's new home will be.

Bring & Buy Sale

We've had an idea! We are going to have a "Charity Bring & Buy Sale" on our stall at the Acorn User Show in September. (See the advert on page 16 for details of the Show.) The idea is that you bring along any old software you don't want, we put a price on it and other folk come along and buy it. The money will go to our charity appeal which has raised well over the £20,000 during the course of the year.

Hope to see you at the Show!

Paul B.

Government Health Warning – Reading this may seriously affect your spiritual health.

Some sat in darkness and the deepest gloom, prisoners suffering in iron chains,
For they had rebelled against the words of God and despised the counsel of the Most High.
So he subjected them to bitter labour; they stumbled, and there was no one to help.
Then they cried to the LORD in their trouble, and he saved them from their distress.
He brought them out of darkness and the deepest gloom and broke away their chains.
Let them give thanks to the LORD for his unfailing love and his wonderful deeds for men,
For he breaks down gates of bronze and cuts through bars of iron.
Whoever is wise, let him heed these things and consider the great love of the LORD.
Psalm 107 verses 10 – 16 & 43.

The New Testament reckons that Jesus (i.e. "the Son") is the key.
Whoever believes in the Son has eternal life,
But whoever rejects the Son will not see life, for God's wrath remains on him.
John 3 verse 36.

Archive

Volume 3 • Nº 11 • August 1990

Contents

Products Available 2
Hints & Tips 5
Comment Column 7
Matters Arising 8
Competition Corner 10
Small Ad's 11
Poster Review 13
'C' Optimisation – Part 2 17
SoundTracker – Part 2 21
Atomwide 4 to 8M Upgrade 25
Help!!! 27
Language Column 28
Contact Box 29
Teletext Adaptor 33
PipeLine 35
Introduction to 'C' – Part 9 40
Hardware Column 42
SCSI Column 44
DTP Column 45
Agenda Portable Computer 46
Chess from David Pilling 49
Using the PC Emulator 50
First Word Plus Column 52
Music Column 53
ArcDFS from Dabs Press 55
"Herewith the Clues" 57
Man at Arms 58
Z88 to Archimedes Link 59
Fact-File 61

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Products Available

• **42M removable hard drives** – Oak Computers are now selling a 42M removable SCSI drive for £1185 + VAT (£1190 inc VAT through Archive) including a SCSI podule. Remove the data cartridge for security reasons or for portability from machine to machine or for durability in transit. Extra 42M cartridges cost £99 + VAT (£105 through Archive). These are true hard drives, not the slow "Bernoulli" type. More details in the SCSI Column on page 43.

• **512M SCSI drive** – Oak Computers are now selling a 512M external SCSI drive for £4085 + VAT (£3990 inc VAT through Archive) including a podule. This is actually a 640M drive but Acorn's software can only access 512M per logical drive – but see SCSI Column on page 43.

• **A3000 memory prices down again.** Morley boards are down to £100 and £265 for the 1M and 3M respectively and Atomwide are down to £90 and £365. The Atomwide 3M board has not gone down in price as much as we had hoped, as the price of the 4M bit chips is still staying fairly high at the moment.

• **A3000 memory boards** – Computerware have now entered the A3000 memory board market with one which uses the same (excellent) philosophy as Atomwide. The idea is that it has 8 chips only. If you want a 1M upgrade, you put eight 1M bit chips in (same chips as A410/1 memory upgrade at £60/Mbyte) but if you want a total of 4Mbytes in your machine, you use eight 4M bit chips. (Sadly, it does not give you a total of 5Mbytes because the internal 1Mbyte is disabled – the existing MEMC can only address 4Mbytes of ram.) The current Archive prices are £35 for the unpopulated board, £90 if it is populated with 1Mbyte and £365 with 4M.

• **A310 memory upgrade prices** are not falling at the moment except that we have some Watford boards we are selling off: 1M at £290 and 3M at £490. Ring if you want either of them.

• **A410 memory prices down again** – A410 – We have now got the price of the memory upgrade ram for A410's down to £60 per Mbyte.

• **Alien Invasion** – Alien Images, Dabs Press' games software arm has produced an Archimedes version of the classic space invaders game. The game play is identical to the original black & white game that I used to play on my 2k Acorn Atom but there are 1,000+ levels, a sprite editor, speed control, etc. £14.95 from Dabs or £14 through Archive.

• **ArcComm is back** – After several months of being unobtainable, ArcComm communications package is back. It has some new features and a new price of £29 + VAT (£31 through Archive). Tim Saxton is having a look at it and I hope to have his comments in next month's magazine.

• **ArcLaser** – A direct rival to Computer Concepts' Laser Direct is now available at £899 (+VAT + P&P) compared with CC's £999 +VAT. It uses the same Qume laser engine, so the difference is in the podule hardware and the driving software. We hope to do a direct comparison soon. The price was £799 but that was only an introductory price so when you add carriage (£12.15 + VAT) you get a total of £1047.82 which is getting pretty close to the all-inclusive Archive price of £1080 for Laser Direct. Unfortunately, Calligraph will not give sufficient dealer discount (unless I buy 10 at a time!) to offer a discount through the magazine so you will have to order direct from Calligraph.

• **CadMust** – Complete design system for digital and analog circuits. CadMust Schematic provides schematic diagram drawing and CadMust PCB gives a PCB layout facility. Both are available from USARC in Amsterdam.

• **ChangeFSI** – A new RISC-OS version is available from Wild Vision for £22 + VAT. Their press release says that Acorn "has decided against placing this program in the public domain and it is being distributed under licence from Acorn."

• **Deeva** from Calderglen Computers Ltd is a sideways scrolling 'shoot-em-up' program for £19.95 inc VAT.

• **EPROM Programmer** – Racing Car Computers have produced an EPROM programmer for the Archimedes including multi-tasking interface software. It costs £149.95 inc VAT, handles standard CMOS & NMOS ROMs from 2716 to 27512 and is available in two forms: an external box with its own p.s.u. that communicates at 19,200 baud via the

serial port and a parallel version at the same price which takes the form of a podule with a ZIF socket on the end of a ribbon cable. They are also doing adaptor boards that will allow it to program micro-controllers.

• **Fan speed controller** – Ray Maidstone, who has been investigating the idea of slowing down the fans on Archimedes computers to reduce the noise to an acceptable level, has come up with a circuit board which does just that. It fixes onto the fan power-supply connector and sits at such an angle that it also acts as an air-flow deflector to ensure that the air which is drawn in actually goes to the parts of the board that need cooling. He has used temperature probes to research all this, so it isn't just a mad-cap scheme. He will be selling them by the time you read this. For more details, contact Ray Maidstone, 421 Sprowston Road, Norwich NR3 4EH.

• **Hostages** from Superior Software, £19.95 (£18 through Archive) is an action graphics adventure about... hostages.

• **Inertia** – A new game from 4th Dimension £19.95 (or £18 through Archive). Explore two huge, colourful landscapes in your highly sensitive craft negotiating ramps, jumps and various hazards. Includes two soundtracks.

• **Interactive Video** – British Nuclear Forum have produced three interactive video discs for use with the Archimedes. One of them has won a 'Nebbie' award. (It's an award from an international interactive video disc organisation in Lincoln, Nebraska.) The idea is that you control the video by clicking on the screen with a mouse and the Archimedes controls the video disc. I played with an Apple Mac version of this sort of thing at the Science Museum in Amsterdam when I was there on my hols. It was great fun and has a lot of educational potential but until it gets going there is no incentive for producers to do the videos and until there are some videos there's no market for the video controllers!

• **Jiglet** from 4mation is a junior version of Jigsaw at only £29+VAT (£30 through Archive). Aimed at younger Archimedians, it gives a choice of 16 pictures made up into 4, 6, 9 or 12 piece jigsaws.

• **Memory Magic** is a game from Cambridge International Software based on an Indian game where you have to remember the contents of a dish having seen it for a certain length of time. (Kim's game, we used to call it.) The price is £15.95 (£15 through Archive) and it is due for release at the All Formats Fair on August 4th.

• **MicciMouse** is a mouse-and-icon driver front end for the Pineapple Digitiser, providing facilities for monitoring, capturing, manipulating and arranging images. The basic version is available for £4 from Chessfield Software. An enhanced version with much more comprehensive facilities is available for £21, also from Chessfield.

• **MicroDrive** – a golf simulator (yes, another one!) from Cambridge International Software. Full 3D view, no power meter but a full use of mouse keys to control the swing. The price is £19.95 (£18 through Archive) and it is due for release at the All Formats Fair on August 4th.

• **NStore** – National Curriculum record-keeping and reporting for primary schools from HS Software (£24.95) stores records on all the Statements of Attainment from levels 1 to 6. Provides various facilities for graphs, level summaries, ranking, etc.

• **Ovation demo disc** – for £5 from Beebug Ltd, you can get a demo disc of their new DTP package, Ovation. It's probably worth having anyway, even if you don't want to buy Ovation because on it are Acorn's Outline Font Manager and a couple of Beebug fonts. The cheapest way to get the font manager otherwise is to buy Acorn's Font Starter pack at £47! The fonts and the manager can then be used with !Draw (free) and FontFX (£10) to very good effect for ultra-cheap semi-DTP.

• **Shareware 31** – now available containing an editor for use with C, graph plotter, desktop magnifier, quacking good demo, funny mouse pointer, 'Secret Garden' adventure, Taipei Chinese game, BASIC program compressor, DFS reader, complete DOS filing system, BASIC access from desktop, computer shutdown from desktop.

• **Shareware 32** – now available containing a whole load of lineart from various sources plus various utilities: sprite to GIF, sprite to TIFF, !Translator, Teletext to sprite, sprite mode converter, util to display info on screen modes, Impression key shortcuts, convert spooled text for Acorn DTP, Text-only printer driver, keystrip for !Draw, palettes to improve LC-10 and Integrex colour output quality.

• **Snippet** from 4mation is a screens workshop for £29+VAT (£30 through Archive). It provides loading, saving, printing, carouselling, etc of screens. It can add borders, change colours and do special effects.

• **WorraCad**, Oak Computers' precision CAD system, is here at last – well, it will be by the time you read this. Oak have gone through several re-writes of this software in order to really get it right as far as importing and exporting via multi-tasking are concerned. It will work properly with Draw, Paint, Impression, Euclid, Genesis, PipeDream, etc. It is object-oriented and uses floating point arithmetic to 18 significant figures. It has tools for generating geometric constructions such as tangents and normals, and other facilities including hatching, dimensioning, scaling, mirroring and rotating. Even with all these features, it will run on an unexpanded A3000. From what I saw of it at the Econet Conference, it is a very impressive piece of software and, in my view, grossly underpriced at £75 + VAT (£80 through Archive). Mind you, they say that this is an "introductory price" although they give no indication of when it will be going up in price. The only bit of bad news, some would say, is that it uses a dongle (identical to the Impression dongle). If you have already got Impression, you can either put the two dongles together or send them back and get a single dongle that will work with both pieces of software.

• **X-Run** is a yet another vertically scrolling shoot-em-up program from XFM Software (£9.95). It is described as having "20kHz sampled sounds, excellent graphics 18 levels, multiple power-ups etc." Having tried out a review copy, it is very similar to YAIG on Shareware 16. XFM are offering a 'special price' to Archive readers of £7.95 – just quote your subscription number.

Review Software Received...

We have review copies of the following: !Help – a teacher's companion to the Archimedes & A3000, World maps, Jiglet, Micro-Trader accounts and The Account Book. A

Home & Business Programs from Apricote Studios

The Account Book: Comprehensive small business accounts to trial balance. VAT approved. Absolutely the easiest program to use, with neat final books and hundreds of reports. No entry limits. "The Account Book gets first prize for both price and performance." – comparison of different business programs in Micro User, July 1989. "A truly user-friendly program. If you buy these packages, you will not be disappointed" – Beebug October 1988 & December 1989. **£27.95**

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Hints & Tips

• **Blanking discs** – (I'm sure we've had this before, but not everyone has picked it up and I couldn't find a reference to it in the Archive database.) If you have a disc that has lots of files on it and you try to clear them all off by deleting them, it can take ages – it would be quicker to reformat the disc. Even quicker though is to get an existing blank disc and do a backup from that to the disc to be blanked – it takes just a couple of seconds.

• **ChkSpr** – In answer to Ray Dawson's plea for help about !ChkSpr supplied on shareware disc 19: if you open up the !ChkSpr directory, amongst the files you will find one called 'chkspr' and one called !Boot'. If these two files are copied into any Impression document directory and if you then rename the document directory, instead of the Impression sprite not appearing because the name no longer corresponds to the document name (as normally happens) it will appear correctly. This is because the chkspr utility, when run by the new !Boot file, checks the name of the first sprite in the sprite file and changes it if the name is not the same as that of the document. This utility can also be used to keep the correct sprites for applications. For example, when developing an application, different versions may be kept, all with the right sprite file. Simon Burrows and Emmet Spier

• **ColourTrans module** – I have noticed that each of the printer drivers on the RISC-OS extras disc contain their own copy of the Colours module! This is at odds with the policy of storing all shared modules in the !System directory (you will probably already have a copy of the Colours module there – many applications use it).

To avoid wasting disc space (though Colours uses little) you can remove this module from within each printer drivers' directory and edit the !Run file for each driver to call Colours from the !System folder.

i.e. in each !Run file the line

```
RMEnsure ColourTrans 0.52 RMLoad
    <PDriver$Dir>.Colours
```

should be replaced with

```
RMEnsure ColourTrans 0.52
    System:Modules.Colours
```

To be even more correct two extra lines should also be added (e.g. like the !Spark and !Draw applications). The above on its own relies on the desktop having already seen your !System directory, you should therefore put the line

```
If "<System$Path>" = "" Then
    Error 0 System resources
    cannot be found
```

before the changed line above to check that this is the case. You should also put the line

```
RMEnsure ColourTrans 0.52 Error
    You need ColourTrans 0.52 or
    later
```

after the changed line – this will check that the module has been loaded satisfactorily.

The Printer Drivers on the original RISC-OS Application Disc 1 did not load the Colours module when they were installed and so do not have this problem. Simon Butler

• **Debugger/Dissassemble** returns an incorrect length for SWI instructions – it returns the length as one too many – you get an extra null character on these instructions. As all returned strings are null terminated, I found it easier to scan for the null in order to find the length. The zero makes no difference to screen or printing, but if written to a text file looks ugly in !Edit. Kevin Quinn

• **Desktop bug** – There appears to be a fatal bug in the Window Manager of RISC-OS 2.00. It occurs when you drag a menu, and whilst you are dragging it, press the <escape> key to remove it. If you then stop dragging the menu, the system will report an 'Address exception at &386BC1C', the application which created the menu will die fatally and most often, all the other applications will die as well, resulting in the computer 'bombing out' of the desktop into the CLI. Tom Lakofski

• **DXF files** – Users of DXF files which are comprised only of BLOCKS and ENTITIES (or maybe just ENTITIES alone) will find that !Draw does not enable the use of its facility for specifying font types when the DXF file is just loaded.

The inclusion of the code below (i.e. a TABLES section) appears to solve this problem. Of course

!Draw must have previously 'seen' the relevant !Fonts directory. The full sequence for the sections, if all are present is HEADER followed by TABLES, then BLOCKS + ENTITIES. Jim Markland

```
0
SECTION
2
TABLES
0
TABLE
2
STYLE
70
20
40
0
41
1
50
0
71
0
3
STANDARD
0
ENDTAB
0
ENDSEC
```

• **Greek3 re-caching** – To stop the Greek3 outline font supplied with Impression from recaching itself too often all you have to do is rename it from 'Greek3' to 'Greek'. Michael Ben-Gershon

• **On/Off icons**, for example option icons in windows, are implemented by using the 's' command in the validation string of an icon with indirected text and sprites on. FormEd will allow you to set these up – switch on indirected stuff, put text (if any) into the text item, and select sprite – don't put anything in the sprite sub-menu writeable icon and put the sprite name(s) in the indirected validation string, e.g. 'sopton, optoff'. Then by inverting the icon's inverted bit it will swap over the icons – see the calls Wimp_SetIconState and Wimp_GetIconState (pages 1211-1213 of PRM). Details of validation strings are on pages 1184-1187 of the PRM. Kevin Quinn

• **OS_Heap** – While trying to use the Heap facility in RISC-OS, we found that OS_Heap 6, which returns the size of a heap block, returns the size **including** the word at the start containing length. This is unexpected given the Abstract Data Type philosophy that appears to have been used for the rest of the system and means that the user knows where the length of a block is stored and can read it without using OS_Heap 6 – and incidentally, means Acorn can't re-write their Heap manager unless this word is left in the same place. James Chong

• **Render Bender on SCSI hard disc drives.** As you will know, you cannot access the hard drive, by using the HARD 4 icon. Some of you may have already tried unsuccessfully to alter the program, by altering the variable HD% to 1, to try to force the program into recognising the hard drive. The following alterations should be made to the !Run file, Render and Anirout in the utilities directory. The code will save all pictures to the specified directory if you have not put the Render Bender directory in $...

For the Render program :

```
   15 *SET RendHard1 SCSIFS::4.$.
                                !Render
   40 curd$="4":moder%=FALSE
15890 A%=32
15940 IF A%=32 AND HA%>0 GOTO 15920
16020 IF A%=32 THEN curd$="4":*SET
       REdrive SCSIFS::4.$.!Render
```

For the Anirout program :

```
6800 IF A%=BE% THEN *SET REdrive
                  SCSIFS::4.$.!Render
```

You should then use the edit program to alter the !Run file as follows:

The line that begins *IF obey$dir... should be changed to...

```
*IFobey$dir="adfs::Render.$.!Render"
    THEN *SET RendHard1 SCSIFS::4.
     $.!Render ELSE *SET RendHard1
                          <Obey$Dir>
```

The previous code may seem a bit long winded but I have unfortunately not been able to get the *KILLADFS command to work with my version. Neil Berry

• **Screen size** – The screen size in O.S. co-ordinates may be found using OS_ReadVduVariables and variable numbers 4 (XEigFactor), 5 (YEigFactor), 11 (XWindLimit) and 12 (YWindLimit). The last

two are hidden over the page and for a while I missed them (pages 345-348 and 350-352). There is also a message that the Wimp broadcasts when the user changes mode, enabling your task to keep uptodate on screen sizes – important for drag boxes amongst other things. See page 1259. Kevin Quinn

• **System Variables for the Filer Module** – This little routine enables you to use RISC-OS variables with the Filer_OpenDir and Filer_CloseDir commands. This means that you can do commands such as "Filer_OpenDir <Obey$Dir>.DataFiles" and make programs totally independent of where they are on the disc. The module requires about 14k of free memory in the RMA. The program has been written in such a way that it should work with all future versions of the Filer.

```
REM >Filer
*RMKill Filer
*RMReInit Filer
*RMFaster Filer
SYS "XOS_Module",18,"Filer%Base" TO
                              ,,,CodeBase%
TableBase%=CodeBase%+CodeBase%!&18
Info%=FN_LookupInfo("Filer_OpenDir")
TableBase%!Info%=TableBase%!Info% OR
                              &00000100
Info%=FN_LookupInfo("Filer_CloseDir")
TableBase%!Info%=TableBase%!Info% OR
                              &00000100
END
:
DEF FN_LookInfo(Text$)
LOCAL Offset%,Command$
Offset%=0
REPEAT
Command$=""
REPEAT
Command$+=CHR$(TableBase%?Offset%)
Offset%+=1
UNTIL TableBase%?Offset%=0
Offset%=(Offset%+16+3) AND NOT 3
UNTIL Command$=Text$ OR TableBase%?
                                Offset%=0
IF Command$=Text$ THEN =Offset-12
        ERROR 0,"I can't find "+Text$
```

There is one slight problem with this routine due to the way that RISC-OS implements the *RMFaster command by re-initialising the module. This means that the Filer icon disappears from the Desktop and cannot be recovered without restarting the desktop so the routine is probably best placed in a boot routine that subsequently starts up the desktop. Simon Callan

• **TWIN 8000** – If you load TWIN at an address other than hex 8000 the <f10> key functions (goto, newtime, etc) do not work. It caused me no end of problems and phone calls to Acorn before I realised this. A

Comment Column

• **A440 hard drive problems** – We've recently had a spate of calls from owners of old 440's. They are complaining that their 20M Western Digital drives are packing up on them – some die slowly but others with no warning. My advice is to keep very regular backups and/or to think of replacing them. This is not a sales plug. Ignore my advice if you will, but don't say I didn't warn you. We can supply replacement ST506 drives for £5 off the price of the A410 drives on our price list because you don't need the cables. In other words, we can do 20M at £205, 40M at £325 or 47M at £405. Otherwise, you could think of putting in an internal SCSI drive from 20M at £400 to 200M at £1470! Anyone with a couple of screw-drivers and a bit of common sense could do the drive replacement – it doesn't need to be done by a service centre (but don't quote me on that!). Ed.

• **Joysticks for sale!** – You may remember that we had tremendous problems trying to get hold of the DeltaCat Mouse Eliminators. (Joysticks, in other words.) For months we were carrying a back order list for dozens of them and had to ask people to send separate cheques for them so we could hold them until a few joysticks dribbled through? Well, in desperation, I went direct to Voltmace and ordered 100 joysticks. They told me they would only be able to supply a few at a time on an allocation basis. Within about three weeks, all 100 were delivered. Great! That's the way to run a business! Think big! Go direct to the source instead of messing about with middle men! There's one slight problem. No one is ordering them now and, having cleared the back order list, we were still left with 75. Still, having ordered direct and in larger quantity, we got

better discount so I dropped the price last month from £28 to £25 and, since then, we have sold precisely two! Anyone want a very cheap joystick? We'll sell them at less than cost if we have to. If you are prepared to take one off our hands, any offers in excess of £20 would be gratefully received! Ed.

• **SPEM 310 Memory Upgrade** – The A2048 memory expansion from the Italian dealer, SPEM, is a 2M memory upgrade for the A300 series, at a little under £300. The memory board is constructed in two parts with the main p.c.b. populated with sixteen DRAM chips. The other p.c.b. just passes the address lines and power over to the main board. The two are joined by a short length of ribbon cable.

This upgrade is like the CJE Micro's upgrade in that it involves desoldering RAM chips and replacing them with sockets, unless they are already present as they would be in an upgrades A305. There are also some tracks to cut on the bottom of the Archimedes' main circuit board and a couple of wires to solder on to it. This is quite an operation to fit it and should only be done by a component level service centre.

There should be ample room to fit an ARM3 upgrade as the boards fit over the existing RAM chips. The memory works perfectly with the MEMC1a upgrade fitted in my machine and it is probably a good idea to fit this at the same time. There is no facility to fit the larger RISC-OS ROMs but it should be possible to make a small carrier for them. It does not appear possible to add another 2M of memory to the board. SPEM might produce something to do this if the demand is great enough. Chris Furlong.

• **Pain in the N.E.C. II** – After a good deal of pain and letter writing, I am no nearer getting the N.E.C. Multi-sync II working properly with my Archimedes. In the multi-sync modes, the display is too small and in all VGA modes the position of the screen is far too far to the left, so far to the left in fact that the picture is wrapped around the back of the screen. All that N.E.C. can say is that "the Archimedes has some, shall we say, interesting timing parameters" and that "we do not recommend our monitors for use with Archimedes computers". B.R.Miller, 77 Galloway Road, Hamworthy, Poole BH15 4JS.

• **Sandie the Walrus Public Domain Software** seems to be a victim of its own success. Archive subscribers have complained that their cheques have been returned with a note to say that STWPD could not fulfil the order. We have spoken to Sandie who said that he had been inundated with orders and was finding it difficult to cope with the volume. He has therefore decided to close down. As from 20th August, he will no longer be fulfilling orders except to honour his offer of free PD software and he will do that only if you send him an E format disc with no errors on it and a return envelope.

He has very kindly said that, because he does not feel it right to make a profit on PD software, he is going to give the excess cash to charity through the Archive charity line. Ed. A

Matters Arising

• **Definitions** – In our list of definitions, one was incorrectly defined and one was missed out. It should read:

SCSI "Scuzzie" Small Computer Systems Interface

Recursion See 'Recursion'

• **Duff discs! Sorry!!** – We bought an auto-loader, which takes 50 discs at a time, to speed up the copying of Shareware and Careware discs. Unfortunately it has been a chapter of accidents. It has died totally twice – once we managed to do a 'flying doctor' type repair over the phone and once it had to go back to the suppliers for repair. The trouble is that, along the way, quite a number of discs have got through that were not copied properly. When they were checked within the copying program, they seemed OK but as soon as they were tried out by the customer, the errors were obvious – many of the discs were totally blank. We still haven't sorted out why it is doing this but we have improved the checking within the program so that it at least knows when it has not successfully copied a disc and so chucks it in the reject bin.

• **Ram boards** – After my comparative review last month, I have had comments from all three suppliers about how their products are actually better than I tried to make out!

Watford Electronics have one or two points of disagreement with my comments and would like us to point out one or two ways in which they are

changing the design of the boards which will answer some of my other criticisms.

1 The ram chips are soldered in because putting them in sockets introduces extra possibility of failure due to bad contacts.

2 The ram chips are low power devices and they will not generate any appreciable heat.

3 The headers used are precision-made boards – they have to be or they would not fit properly. Although they are quite inexpensively made, they are as effective as the others and cannot be said to be of inferior quality of construction.

4 The 4M board has been re-designed to allow it to fit in with an ARM3 board. (The ARM3 board has also been re-designed to allow it to fit with the ram upgrades. This is done by placing the ARM board vertically inside the computer up against the case.) Both of these new boards should be available "in a week or so" (10.7.1990).

5 Both the ram boards and the ARM3 boards now come with a substantial plastic insulation layer.

6 The Watford boards come with a special chip extraction tool which can be returned for a £5 voucher.

7 The 2M board is returnable for replacement with a 4M board for the difference in price plus postage.

Protokote also had various points of disagreement with my findings.

1 They have had machines with the old MEMC1's running since September with no ill effect caused by adding the ram board and cannot see how the life of the MEMC could possibly be shortened.

2 The board already has provision for separate power connections to the main p.c.b. but as the boards worked OK just drawing current up the ribbon cables so they decided it would simplify things for the customer if they were left off. They have decided, in view of our criticisms, to go back to using separate power leads and will fit them retrospectively if customers wish.

3 The reason Protokote said you should use one specific type of ram chip for upgrading is because to get reliable results with MEMC1, they found they sometimes needed to use 80 ns ram (i.e. faster than the usual 100 ns ram). With the MEMC1a's, all the different types of 100 ns ram they tried worked reliably. They therefore decided to recommend use of the Fujitsu ram which worked on both MEMC1 and MEMC1a machines because it was thought to be less confusing to the customer than suggesting different types of ram for the two MEMC's.

4 Protokote agree that using earth-interleaving on ribbon cables is normal practice but the cable lengths were so short that they decided it would probably not be necessary. They carried out numerous tests and it worked OK without the extra earth lines, so they left it as it was.

5 The tracks that need cutting to allow you to use the new larger OS ROMs when (and if) they come, are on the EPROM carrier board not on the main Archimedes p.c.b. and the changes can be made without removing the board from the computer. It only requires one or two wires to be soldered onto the relevant chip on the main Archimedes p.c.b. They say that this can be carried out by any competent dealer, not necessarily a Component Level Service Centre.

6 Protokote are taking steps to ensure that their boards will fit properly with the Aleph One ARM3 upgrade. Presumably, if you have an older version and want to use an ARM3, Protokote will help you to sort it out.

7 Protokote do provide a free fitting service to those who need it, including courier collection & delivery. They also offer a full guarantee.

Computerware didn't complain about the review as their's came out on top but they did say that they have now decided to provide sockets for the second 2M of ram on the 2M boards. This means that upgrading their 2M board is simply a case of plugging in an extra 2M of ram chips and changing one of the PAL logic chips on the board. With care, this can be done by the customer. Although the ram is the same as we supply for the A410, the fact that you need the new PAL chip means you have to buy the upgrade from Computerware which they sell at the difference between the two prices, i.e. £205.

Independent evidence? – The Watford board, if you remember, was criticised for the way the ram chips were upside down and fairly close to the components on the main p.c.b. We were worried about the possibility of over-heating but one of our readers, Trevor Attewell, has done a bit of investigation to

find out whether putting ram chips close to other components really can cause over-heating. He did some tests with a thermistor on the CJE Micros' upgrade. This seems to show that the temperature rise is not significant, the outside casing of the ram chips being only about 22 degrees above ambient. (The CJE Micros' upgrade, by the way is fully compatible with MEMC and/or ARM3 upgrades as it tucks the ram away under the metal bridge that carries the disc drives.)

• **Relational Database** – There is, at present, a big argument brewing between one of our subscribers and Silicon Vision over DataVision, their database program. Silicon Vision in their adverts claim that DataVision has "sophisticated relational data entry, relational reporting..." and "relational interrogation and reporting...". The subscriber bought a copy of DataVision and, having tried it, reckoned that the claims were somewhat exaggerated and returned the package asking for a refund. Silicon Vision then returned the package to the customer with a long letter explaining why they thought it was relational and that it "out-performs many heavyweights in the PC market including the popular dBase product". Unfortunately, the customer has been in computing for 20 years, has been a data analyst and currently works as a PC consultant, so the discussion continues!

• **Shareware Fonts Discs** – For the last few weeks, we have been discussing the legality of the "PD" fonts on Sharewares 27, 28 and 29. We have decided that the technique by which they were produced, code conversion from PC fonts, is against the spirit of the copyright laws, if not against the letter of those laws. We have decided therefore not to supply these fonts. Sorry about that. Similar(?) "PD" fonts are available for download from various bulletin boards (not Archive BBS) if you are happy with the idea.

• **Taxan monitors** – On the subject of Taxan monitors, sources within Acorn have said that they wouldn't recommend dealers to supply the Taxan 775 multi-sync for use with Archimedes or A3000 computers because of the extra adjustments that have to be made to get an acceptable picture. They recommend the 770LR instead. Beebug however are aware of Acorn's recommendation but insist that they are OK. Has anyone got a 775 who can give us an independent view?

• **VIDC enhancers** – Some people are having problems with the VIDC enhancer on Taxan monitors. It seems that people are having problems with the new modes not 'locking up' properly – the displays are therefore unusable. Changing the parameters slightly makes it work but then the new mode won't work on other people's Taxans. There does seem to be quite a variation in the specifications of apparently similar Taxan monitors. If you are having problems, let Atomwide know and they will send you an alternative MegaMode to try. Alternatively, they have released the source code of their MegaMode module so that you can tinker with it yourself if you feel technically competent. If you want a copy of the source code, drop us a blank disc and we will send it to you (assuming you bought the VIDC enhancer from us, that is!) A

Competition Corner

Colin Singleton

When is a number not a number? When it is a word!

This puzzle was inspired by a short paper on word chains sent to me by the author Dr W O Riha of Leeds, an enthusiastic follower of this column.

Word chain puzzles usually ask you to change, say, DOG into CAT in three steps, changing just one letter at each step and producing a valid English word at each step. Thus DOG, DOT, COT, CAT.

Dr Riha offers the challenge of finding (using a computer) the longest possible word chain using a selection from a given list of words.

The competition

For this competition I am making two significant changes. Firstly, I am introducing the concept of word circles. The above sequence can be extended to DOG, DOT, COT, CAT, BAT, BAG, BOG, (DOG) forming a seven-word circle. You are not allowed to use the same word twice. (No prizes for completing the DOG, CAT (DOG) circle in six words.)

Secondly, since I want a longer list than I could reasonably include in this text and I cannot assume that every reader has an on-line dictionary, I am using prime numbers instead of words. Each number

is derived from the previous by changing one digit, and each must be a prime number. Small numbers should be extended as necessary by the addition of leading zeros. Hence the circle 041 433 (041) can be completed with six numbers 041 043 443 433 431 031 (041).

To enter this competition you must write a program to split the 168 prime numbers less than 1000 into a number of groups, each group forming a circle. Every prime number must be used once, but none may be used more than once. The winner of the £50 token will be the one who forms the smallest number of circles.

If you find this too easy and manage to include all the numbers in a single circle, then try the same puzzle with the primes less than 10000. The winner will be judged by this puzzle if necessary.

Entries and comments please either via Paul at NCS, or to me at 41 St Quentin Drive, Sheffield S17 4PN.

The winners!

We have joint winners of the April (Easter Day) competition. Dr W O Riha, of Leeds and Hans Kommeren, of Breda, Netherlands were the only ones who found the length of the cycle (5,700,000 years). There was little to choose between their entries. Hans sent a proof of the cycle, but Dr Riha's program ran faster. So the prize is shared, £25 each.

The £100 special prize for the Perfect Numbers competition is also shared. Dr Riha again produced the fastest coding. Fred Hartley (who wrote an article in Archive on Arithmetic with long integers, and made good use of it) persevered to find the first 20 Perfect Numbers in just over 24 hours.

Not too late yet

Entries are still coming in for the June (Cities) puzzle. No-one has quite managed to pack them all in. Any more offers? A

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- **World Class Leaderboard**, Pacmania, UIM, Greydumps, Arthur P.R.M. All in ex. cond., Offers to Michael Pargeter on 0462–434061. A

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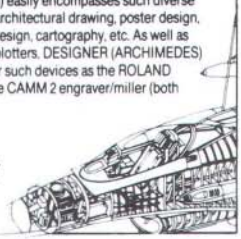

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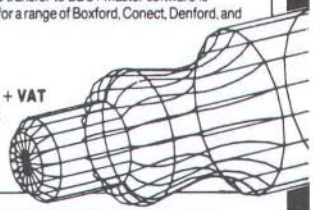

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Poster from 4mation

John Schild

4mation's "Poster" is a useful and powerful text and graphics tool. It has much to offer to producers of publicity and newsletter material, or those involved in DTP work with a large display component. I imagine a typical user as someone (like me!) lacking the necessary skill to produce their own original artwork but capable of pushing other people's images around on the screen. Set alongside Edit, Draw and Impression on the icon bar, it forms a powerful and versatile environment for the production of graphic display material.

The package

Poster arrives on three 800k discs. Disc 1 contains the application and sample borders, fonts, moulds and paths (more about those later). Disc 2 contains more borders and fonts, while disc 3 contains additional moulds and a variety of Draw files of the "line art" variety. As a protection against piracy, the application disc cannot be run until an initialisation routine is completed, in which the master disc is imprinted with a name or other data to identify the owner. Thereafter, the disc can be copied to another floppy or to a hard disc without hindrance. It is rather less discrete than Pipedream however, because an ugly and accusing window opens up on the screen displaying the owner ID every time the application is selected. It tactfully disappears when snapped at with the mouse.

The 90 page manual clearly owes a lot to Poster in its own production and is clear and comprehensive in its information, while relaxed in style. A friendly touch is a set of nine worksheets containing a guide to all the basic operations. This may be freely copied, presumably for classroom use. An impressive file of Poster-produced documents is also included.

Poster has 20 of its own decorative fonts. They are of sufficient, if somewhat variable, quality. The best of them are also available under different names from the Electronic Font Foundry at £25 (plus VAT) for three. *(I understand that they are from the same source as the Poster fonts but they are not identical. Ed.)* They are all decorative fonts for display rather than formal fonts for body text. The VDU and print quality seem quite satisfactory.

Poster in use

The manual offers sensible advice to floppy disc users who need to make decisions about how much of the software to copy onto working discs for maximum convenience. Hard disc users have no problem.

Once you have created your working discs, double clicking on the filer icon loads Poster to the icon bar. In familiar RISC-OS style, clicking on the application icon opens a blank window which can be pushed around and sized in the usual way. It is fully multi-tasking and accepts the filer icons of Paint, Draw and Edit files. It occupies 448K of memory and is claimed to work on a 1 Meg machine but clearly 2 Mbytes of RAM are desirable for convenient operation.

Poster is an object-based package allowing the user to move, copy, stack, scale, rotate and distort, text, Draw files and (to a lesser extent) sprites. The page can be composed of any combination of these items grouped, scaled and placed to produce the final output.

Pressing <menu> over a Poster window calls up the main menu and this leads in turn to sub-menus controlling all other functions. Key short cuts are available for the most often used functions. A Poster image of a function key strip has been included in the package.

Poster will accept text, vectored and bit-mapped images. It might be helpful to describe firstly the inputting of text, which can be "normal", "path text" or "moulded text". Text frames are a separate option.

1. Normal text is rather dull compared with the other options. Running through the text menu options you can choose the font type and font size for your text, open a text entry box and enter a single line of text. Click <select> and this appears in the window. By clicking on it with select it is framed in familiar Draw style and can be moved and scaled but not rotated.

2. Path text is more entertaining. A "path" is any single line produced by a utility such as Draw. A directory full of useful paths has been provided with Poster but you can add to them with ease. If you have an identified path object – a circle, a wavy line, or

what-have-you – selected on the screen, text typed into the entry box will be set out along the path. Menu options allow you to centre, justify or scale the text along the path to secure the required effect and it can be manipulated in ways that resemble but exceed those offered by FontFX.

3. Moulded text is the ultimate fun! Any two or four paths can be identified as a mould and, following a straightforward set of instructions, you can pump text into a mould and see it distorted to fit the mould in ways which range from the magnificent to the frankly hideous. A selection of ready-made moulds is provided but a routine is offered for you to produce your own with ease.

4."Area" text. Text produced in Edit can be loaded into Poster and displayed in a frame as one or two column text. Text area frames can be moved and scaled – either scaling the text with the frame, or leaving the text the same size while the frame shape is altered. Text entered in this way cannot be edited in Poster, but it can be passed back to Edit, where it is now displayed complete with style information embedded. This style information can now be altered or added to, so that when passed back to Poster, additional fonts, etc, can be displayed. It is actually a lot quicker and easier than my cumbersome description might suggest.

5. Draw files can be dragged into Poster windows and scaled, flipped, copied and rotated. The familiar Draw options of line thickness and capping styles and fill colour and pattern are provided. Draw files can also be poured into moulds and distorted to produce some startling effects.

6. Bit image sprites can also be dragged in from an art package or scanner and can be moved and scaled but not rotated or moulded.

7. Borders. A wide range of attractive borders is available from the menu to place around frames. A style box allows the user to test the effect before adding the border – the result can be most effective.

Producing the final image

All the facilities which Draw and Impression users have come to take for granted have been built into Poster, allowing frames to be moved, scaled and grouped. The final grouped image can then be printed, stored as a Poster file, or as a Draw file which can either be filed or dragged into a DTP window. The one limitation I have discovered is that you can't export a text area to Impression. You get an empty frame but you can then replace the missing text from the original Edit file.

Optional grid and zoom facilities are on offer as an aid to composition and a "full view" option allows the whole of the working window to be seen at once; useful for making final adjustments before printing.

It is the printing facility which lifts Poster above the commonplace. A Poster document can be up to 999 by 999mm in size. The working window size can be preselected from a menu to correspond with the familiar A-sizes and up to six personalised window sizes can be stored and loaded at will. The RISC-OS printer drivers are employed and the print dialogue box shows the Poster window area divided up by a grid indicating how the final output will be printed. Print area data is read from the printer driver and the working window of up to a metre square is printed frame by frame. Poster's crowning glory is that menu options enable each page coming off the printer to be over-printed with butt and overlap marks so that the poster can be pasted up accurately to the final size.

Conclusions

The review sample, first issue 1.02, arrived with a release note listing five known bugs. Yes, the system did crash from time to time. I suspect that multitasking Poster with Impression also led to Impression crashing once or twice during print operations – but that is a suspicion, not an accusation. 4mation promise a free upgrade to all registered users once the bugs have been fixed and are currently deciding how to administer the promise – watch this space.

Crashes apart, Poster stood up to my initial abuse with remarkably good humour. It did everything it claimed to do and that is at least as much as I guess most users will want it to do.

My criticisms are few and really quite trivial. I wish Poster could handle bit-mapped images as comprehensively as Draw files and I wish that when printing out multi-frame documents, it didn't waste time printing out the empty frames (unless you wanted them for paste-up purposes) and that the print dialogue window gave some indication of where the Poster image resides in its frame.

Poster might seem a bit pricey at £89 + VAT. However, for the moment at least, it is unique, it is powerful and it is fun. What more could one wish? A

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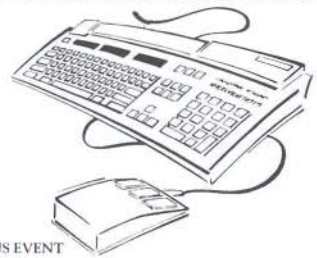

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'C' Optimisation – Part 2

Keith Marlow

As promised last month, I'm going to concentrate in this article on the optimisations that can be made from using register variables and the internal format of data structures.

Firstly, an apology for those who tried out the binary search programs – the test 'high <= low' was wrong! It should have been 'high >= low' (or 'low <= high'): this has now been corrected.

The savings to be gained

For those who don't believe me, I shall prove that the optimisations used do indeed work.

Program SpeedTest

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
int values[1000];
int slow_search( int find )
{
int half,
    low,
    high,
    found;
found=0;
low=0;
high=999;
while( low<=high && !found ) {
  half=( low + high ) >> 1;
  if( values[ half ] < find )
    low = half + 1;
  else
    if( values[ half ] > find )
      high = half-1;
    else
      found = 1;
}
return found ? half : -1;
}
int fast_search( int find )
{
int half,
    low=0,
    high=999;
while( low<=high ) {
  int temp;
  if( ( temp = values[ half = (low +
              high) >> 1 ] ) < find )
    low = half + 1;
  else
    if( temp > find )
      high = half - 1;
    else
      return half;
}
return -1;
}
int faster_search( register int find
)
{
register unsigned int low = 0;
register unsigned int high = 999;
register unsigned int half;
register int temp;
while( low <= high ) {
  if( ( temp = values[ half = (low+
            high) >> 1 ] ) < find ) {
    low = half + 1;
    continue;
  }
  else
    if( temp > find ) {
      high = half - 1;
      continue;
    }
    else
      return half;
}
return -1;
}
int main()
{
int loop,
    outer_loop;
time_t start,
       stop;
for( loop = 0; loop < 1000; loop++ )
  values[ loop ] = loop * 2;
printf("Slow\n");
start = time( NULL );
for( outer_loop = 0; outer_loop <
                  300; outer_loop++ )
  for( loop = 0; loop < 2000; loop++ )
    slow_search( loop );
stop = time( NULL ) - start;
printf("  Total time %d\n", stop);
printf("Fast\n");
```

```
start = time( NULL );
for( outer_loop = 0; outer_loop <
300; outer_loop++ )
  for( loop = 0; loop < 2000; loop++ )
    fast_search( loop );
stop = time( NULL ) - start;
printf("  Total time %d\n", stop);
printf("Faster\n");
start = time( NULL );
for( outer_loop = 0; outer_loop <
300; outer_loop++ )
  for( loop = 0; loop < 2000; loop++ )
    slow_search( loop );
stop = time( NULL ) - start;
printf("  Total time %d\n", stop);
}
```

The program above contains three versions of the binary search algorithm. The first version (slow_search) has had no optimisations performed on it. The second version (fast_search) uses the loop termination and expression duplication optimisations and the third version (faster_search) is version two with register variables.

Executing this program produced the following times:

		Speed increase
Slow_search	38 seconds	
Fast_search	24 seconds	58%
Faster_search	22 seconds	73%

(The times above were obtained using the Acorn version 3 C compiler on a standard 310 – naturally your times may vary from these).

The Fast_search is 58% faster than Slow_search and Faster_search is 73% faster than Slow_search which means that, despite the fact that Acorns' C compiler performs some automatic optimisations, there is still plenty of performance to be gained.

It would be interesting for those of you with ARM 3 processors to send your timings of the above program (and indeed any other programs) to me as it would then be possible to see what optimisations work best with each processor.

Register variables

By definition, the register storage class modifier tells the compiler to place (when possible) a variable into a processor register. This variable will then be quicker to access than one held in memory. Fortunately, with the ARM processor, we have registers which are both bigger and more numerous than those available on other processors.

With the Acorn C compiler we can declare up to six objects to have the register storage class. The valid types that can have this modifier are:

a) any integer type (i.e. char, short, int, long, float)

b) any pointer type

c) any structure type which contains only bitfields and which is no more than one word long.

In Acorn's C manual you are recommended to define only up to four register variables in each procedure. I would suggest that you conform with this as the more registers taken up by register variables the less registers will be available to hold any temporary results. Also, by conforming to this, you leave room for global register variables (see below).

Where to use register variables

If we are limiting ourselves to only four register variables at a time, it is important that we choose the variables to be held in registers carefully.

Firstly, as previously mentioned, only use register variables where they will have the most effect, namely repeated code. Clearly, the gains made from optimising a piece of code executed only once will be minimal compared to those gained from a piece of code executed a thousand times.

Now that you have identified the offending code, look for the variable that occurs most frequently in the expressions. This is done because the most frequently occurring variable will probably have the most memory accesses associated with it and so will gain the most from being made a register variable. Hopefully, this variable will be one of the above three types, if it is, all you do is put 'register' before where it is declared, i.e.:

```
unsigned int low = 0;
```

becomes:

```
register unsigned int low = 0;
```

It's that easy !

This can usually be repeated for the second, third and fourth most frequently occurring variables but it must be remembered that by using register variables we are using up physical registers, thus reducing the space available to hold temporary results. Indeed it is possible that using up all the register variables

could slow down execution since much more address recalculation will be required when accessing variables. Also, it is possible for register variables to be held occasionally in memory (Acorn C Manual p145). So, as a rule of thumb, only use all of the register variables when there are less than six variables being accessed in the section of code.

Below is program BinD with register variables:

```
register int high = TOP,
             low = BOTTOM;
while ( high >= low ) {
register int half;
register int array_value;
if( (array_value = array[ half =
       ( high + low )/2 ]) < VALUE )
  low = half + 1;
else
  if( array_value > VALUE )
    high = half - 1;
  else
    goto found_jump;
}
found_jump:  ...
```

Global register variables

With Acorn's Release 3 compiler, it is now possible to put a global variable into a register. Due to the fact that for every global register defined you lose the possibility of that register ever being used to hold a local variable, I would suggest that this facility is only used for an extremely well-used global variable. The use of global register variables are shown below with an example taken for the C release note :

```
struct frame {
struct frame *sp;
int sp, pc;
};            /* example structure */
#pragma -r1   /* put the next global
                 variable in the */
extern int sp; /* 1st (integer)
                  global register. */
#pragma -r2   /* put the next global
                 variable in the */
extern struct frame *fp;    /* 2nd
       (integer) global register. */
#pragma -r0     /* no more use of
                   global registers. */
```

If you wanted more than two global register variables you continue with '#pragma -r3' then '#pragma -r4'. Again, as mentioned in the C Manual, it is advisable not to have more than two global register variables.

Using the internal format of data structures

An interesting insight into the internal mechanisms behind data structures can be gained from the following program :

```
#include <stdio.h>
#include <stdlib.h>
#include <time.h>
struct {
int first;
int second;
int third;
} test_str;
int main();
{
test_str.first=1;
test_str.second=2;
test_str.third=3;
}
```

If this is compiled with the -S option we get the following assembly listing:

```
main
LDR  a1,[pc, #L000034-,-8]
MOV  a2,#1
STR  a2,[a1, #0]
MOV  a2,#2
STR  a2,[a1, #4]
MOV  a2,#3
STR  a2,[a1, #8]
MOV  a1,#0
MOVS pc,lr
```

As can be seen, the compiler has performed the optimisation of storing in all the location of the structure and using offsets to access the individual components of the structure. The STR instruction has been used with an immediate offset so that the addition required to calculate the final address of the component will not take any extra time. It would therefore be desirable to try and ensure that such an instruction will be produced as a result. This is in fact what normally will occur since the offset can be any value up to 4095 bytes but if it goes over this limit, additional work, and therefore time, is required to calculate the address of a component. The program below shows this :

```
struct {
char first[5000];
```

```
char second[5000];
char third[5000];
} test_str;
int main()
{
test_str.first[0]=1;
test_str.second[0]=2;
test_str.third[0]=3;
}
```

This results in the following assembly listing:

```
LDR    a1,[pc,#L00003c-,-8]
ADD    a2,a1,#&3000
ADD    a3,a1,#&2000
MOV    a4,#1
STRB   a4,[a1,#0]
MOV    a1,#2
STRB   a1,[a3,#-3192]
MOV    a1,#3
STRB   a1,[a2,#-2288]
MOV    a1,#0
MOVS   pc,lr
```

Two ADDs have had to be performed to provide addresses from which the immediate offsets can be used. Therefore it can generally be concluded that structures larger than 4095 bytes have components which are slower to access than those with less, solely due to the fact that they are more than 4095 bytes from the beginning of the structure. The occurrences of this slow-down can be reduced by putting the larger components towards the end of the structure. In fact, you could reduce the work required to access these components by accessing them through a pointer, as shown below:

```
#include <stdio.h>
#include <stlib.h>
#include <time.h>
struct {
  char first[5000];
  char second[5000];
  char third[5000];
} test_str;

int main()
{
register int loop,
             outer_loop;
time_t start,
       stop;
char *second_ptr;
printf("Access through structure\n");
start=time(NULL);
for( outer_loop=0; outer_loop<3000;
                        outer_loop++) {
  for( loop=0; loop<2000; loop++) {
    test_str.second[ loop ]=1;
    test_str.second[ loop+1 ]=2;
    test_str.second[ loop+2 ]=3;
    test_str.second[ loop+3 ]=4;
    test_str.second[ loop+4 ]=5;
    test_str.second[ loop+5 ]=6;
  }
}
stop=time(NULL)-start;
printf("  Total time %d\n",stop);
printf("Access through pointer\n");
second_ptr=test_str.second;
start=time(NULL);
for(outer_loop=0;outer_loop<3000;
                        outer_loop++) {
  for(loop=0;loop<2000;loop++) {
    second_ptr[ loop ]=1;
    second_ptr[ loop+1 ]=2;
    second_ptr[ loop+2 ]=3;
    second_ptr[ loop+3 ]=4;
    second_ptr[ loop+4 ]=5;
    second_ptr[ loop+5 ]=6;
  }
}
stop=time(NULL)-start;
printf("  Total time %d\n",stop);
}
```

On my system running this program results in 42 seconds when accessing through the data structure and 37 seconds when using a pointer (i.e. about 13% faster). Note that in some cases it can be quicker to go through the data structure. This usually occurs when repeated access is made to the same position in a data structure, as the compiler can temporarily store this position in a register (this is why in the program above, array elements loop through to loop+5 are accessed, so stopping this optimisation ruining the timings).

It must also be remembered that the pointer also has the facility to be easily incremented and decremented. Thus, if it points to an array, relative movement through that array can be easily achieved with little cost.

In the same way, a pointer to an array of structures would be quicker than direct access to the array itself, but only in the case when these accesses are

well dispersed through the code. When the accesses are close together, the compiler will notice this fact and, as above, will store the base address of the structure element in a register for use in place of the other expressions. I believe from the description given in the ANSI C Release 3 Release Note (page 10) that this optimisation is known as Common Subexpression Elimination (CSE).

Coming next

In the next article I shall be looking into the area of optimisation with respect to the final code size. If you have any problems, queries or suggestions, I can be contacted on Archive BBS (user number 224) or write to me at 21 Courtenay Close, Bowthorpe, Norwich NR5 9LB. A

SoundTracker – Part 2

Toby Simpson

Firstly, an apology to those who took the time to write to me and haven't yet received a reply – I will write back to you, I promise! Considering the response I had, I am thinking of setting up a library of disks, with both soundtracker files and parts of the hundreds of megabytes of Amiga clip art and pictures I have (ranging from Jean Michel Jarre to 4096 colour pictures of spacemen!). Anyone who is especially interested in any of these, do write to me. I will make some more soundtracker tunes and a disk full of pictures available for the Archive shareware library. (Shareware 30 is the first of the soundtracker discs.)

The enquiries I had concerning soundtracker fitted almost exactly into two distinct groups: those who wanted to know more information about it and those who wanted more soundtracker tunes. In addition to that, I had some general suggestions and a superior version of my BASIC Stereo program (see below).

Information about soundtracker

Firstly, a quick re-cap on soundtracker terms: a 'soundtracker module' (not to be confused with a 'relocatable module') is a single file containing all the information necessary to play a soundtracker tune, including samples and song data. A soundtracker 'song' is just the data for the song itself, without the samples. A soundtracker song occupies considerably less disk space than a module, but it is not independent – it requires soundtracker itself to load in the required instruments. Soundtracker itself is a program to allow the creation, playing and editing of soundtracker songs, with the option of saving or loading modules.

A soundtracker song is made up of individual patterns, each pattern containing 64 positions. One position can contain one note and/or one command for each of the four possible voices. For those wondering why there are four voices and not eight: all this originated from the Amiga, which only has the four voices. A 'note' consists of the note itself, the octave and the instrument it is to be played with. There is a maximum of 32 instruments with the present versions of soundtracker. A 'command' consists of the command type and the optional parameter or data. The possible commands are as follows:

0	Arpeggio
1	Portamento up
2	Portamento down
3	Portamento
4	Vibrato
A	Slide volume
B	Position jump
C	Set volume
D	Break pattern
E	Set filter (See below)
F	Set speed

Command E is not applicable for the Archimedes, as it controls the high pass filter available on the Amiga. The Archimedes versions of soundtracker (both the players and the editors) ignore this command.

An example position for the four voices might look like this:

Voice:	0	1	2	3
Amiga stereo:	Left	Right	Right	Left
00	A#201000	C-306000	C#301000	C-203000
01				
02				

It may seem a bit complicated but it is pretty easy to decode. There are four columns, one for each of the four voices. The first three characters (in the first column, for instance, A#2) is the note itself, A

Sharp, octave 2. The next two digits is the sample to be used, in this case, is 01. The next three digits is the command to be used, in this case, 000 – none. For a command, the first digit is the command itself (0-4/A-F) and the second two is the optional parameter for that command. (An example command might be C05 – Change volume to 05). All parameters for commands are in hexadecimal (base 16).

The soundtracker playroutines scan down a pattern, processing each of the positions in turn, so quite complex patterns can be built up out of these commands. A soundtracker song is made up by connecting these patterns in any order you like. Basically, you design your patterns and string them together so that they sound right.

To understand how the songs actually play, imagine you are manually playing a soundtracker song. You only have to keep a running count of where you are in the tune (the song position). You start at zero. You then look up which pattern is to be played for this song position. When that pattern has been played, you increment the song position by one and look up the pattern for that one. Just keep going until you've reached the final song position. Suppose you have designed three patterns, and the song is 5 in length, you wish to play pattern 0 twice, then pattern 1, 3, 2 and finally 3 again. The song data looks like this:

Song position	Pattern number
00	00
01	00
02	01
03	03
04	02
05	03 (End of song, repeat...

To summarise, a soundtracker song is made up of the following information:

– General information: Tune name, length, etc
– Song data – song position with corresponding pattern.
– Patterns – patterns required by the song data.
– Sample information (instruments) – sample name, length in bytes, repeat information.

In addition to the above, a soundtracker module contains all the sample data for the instruments, which makes the file considerably longer, but it is totally independent and thus can be used in games, demonstrations, etc.

If you listen carefully to a soundtracker module (such as those on Shareware disks 23 & 30), you should be able to pick out the patterns. Each one should last around 8 seconds, depending on the speed at which the tune is been played. It should be relatively easy to pick out the pattern changover points and spot the repeated patterns. On Shareware 30, you will find a program called "!RunThis" – double click on it and you will be able to listen to a soundtracker module play with some of the information shown on the screen. You should be able to relate what appears on the screen to what I have said above (I hope!). Also, there is a selection of new modules that I have, some of which don't quite play as they should do. This is due to a small problem with the player routine which doesn't yet handle sample repeat looping correctly, however the tune itself (ProgFunk) is still very impressive!

An improved version of my BASIC stereo effects program (with go-faster stripes etc!) was sent to me by Malcolm Banthorpe. Before running it, save it and then start a soundtracker module playing.

```
 10 speed%=3
 20 separation%=90
 30 REPEAT
 40  FOR angle%=0 TO 360-speed%
                          STEP speed%
 50   FOR channel%=1 TO 4
 60    position%=127*SINRAD(angle%
          +separation%*channel%)
 70    OSCLI("stereo "+STR$channel%
              +" "+STR$position%)
 80   NEXT
 90  NEXT
100 UNTIL FALSE
```

It's a case of pressing <escape> to leave it, and the effect is quite fun.

I hope these few comments have been of some assistance. If demand is sufficient, I will go into more detail concerning file formats and some actual data. We may even start playing with some BASIC programs to extract information out of soundtracker modules. Here's my address again – feel free to write – I will write back, eventually!

Toby Simpson, 37 Wingfield Road, Norwich NR3 3HF. (Via CIX: toby@cix) A

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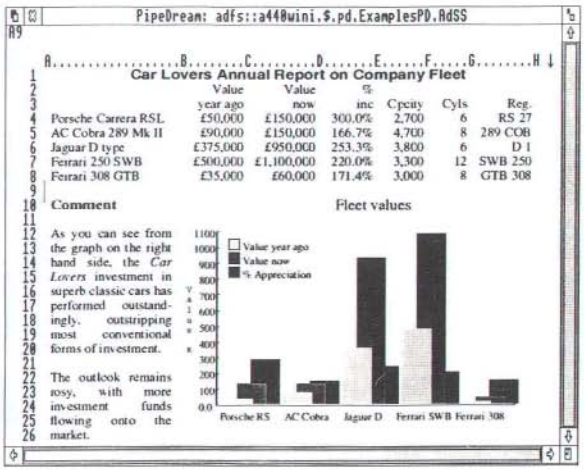

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Atomwide 4 to 8Meg Upgrade

Alan Marshall & Alan Barclay

Firstly there is the saga of how Alan Marshall fitted his own 4 to 8Meg upgrade to his old (very old!) A440. It should give others a view of the upgrade, including the potential problems, especially on some of the very oldest 440's, and help you to see whether or not to take advantage of Atomwide's free fitting service. Then Alan Barclay gives his comments from an engineering viewpoint. Alan Marshall starts...

My machine is an early model A440 which I have upgraded myself in various stages including replacing the 20Mb hard disc with a Computerware 47 M unit, replacing the MEMC with a MEMC1a, adding an Aleph One ARM3 and an Atomwide VIDC enhancer. So you will see that I have played around with the insides of my computer more than once!

Memory upgrade

When the memory upgrade arrived I followed the instructions carefully. On the whole, the fitting instructions are very good. I needed to strip the computer down completely, unplugging all cables to the back of the machine and removing the podule backplane. The floppy and hard drives had to come out and all connections to the main p.c.b. had to be removed. The idea is to slide the p.c.b. out of the case by about five inches but I actually removed it completely and placed it on an earthed anti-static mat. I removed the plastic peg in the middle of the p.c.b. so that it rested flat on the mat.

ARM3

As I already had a 30 MHz Aleph One ARM3 board fitted, I removed this first. It seems there are a number of different types of PLCC header used by Aleph One and the one on my ARM3 board was of the wrong type, according to the instructions. Martin Coulson of Atomwide, kindly provided a replacement ARM3 board with the correct header. Incidentally, only the Aleph One ARM3 boards can be used with this memory upgrade – other types (Watford and Gnome) are incompatible.

Fitting the MEMC board

The next step was to remove the MEMC1a chip from the Archimedes p.c.b. and insert it into the vacant socket on one of the two p.c.b.'s supplied in the upgrade. This is referred to as the MEMC p.c.b., and comes with two sockets, one containing a second MEMC1a and the other vacant. This was quite a simple task with the correct tool, indeed I would never have attempted the job without it.

I then fitted the PLCC header on the MEMC p.c.b. into the vacated MEMC socket on the Archimedes p.c.b. and the two pin socket at the other end of the MEMC board over the two-pin fan power connector on the edge of the Archimedes board. It all seemed to fit securely but I noticed that the p.c.b. was not parallel to the main p.c.b. There were two reasons for this: a black device in a DIL socket near the edge of the Archimedes p.c.b. was touching a set of links on the MEMC p.c.b. and the fan power connector pins on the Archimedes p.c.b. were too long!

Refitting the ARM3 board

The next stage was to fit the ARM3. I used the replacement ARM3 board with the new style header which raises the ARM3 p.c.b. slightly so that its left hand edge overlaps the right hand edge of the MEMC p.c.b. A piece of insulating material was already fitted to the MEMC p.c.b. to prevent short circuits with the ARM3 board.

Reassembling the computer

I then reassembled the computer and looked at my watch: 40 minutes spent so far. I refitted the hard and floppy drives with some difficulty. Neither seemed to want to rest squarely on the mounting bar. In particular, the floppy disc drive fouled the ARM3 chip itself and screwing it down flexed the Archimedes p.c.b. alarmingly. I tried inserting a floppy disc in order to position the drive correctly in relation to the fascia but the eject button kept falling out onto the table. I was concerned, but not paniced.

Fitting the RAM board

The second p.c.b. in the package, the RAM p.c.b., fits, podule-like, into the backplane. It can only be used in the socket that was intended for a co-processor – the one nearest the connector to the p.c.b. (slot 0). This is because it is the only socket that provides all the necessary address lines as is clearly indicated, both in words and on a diagram, in the instructions. The ribbon cable from the MEMC

p.c.b. mates with a socket on the RAM p.c.b. It is obvious which way round it goes and it has a bump to make it very difficult to insert it the wrong way anyway.

Powering up

The next stage was a thorough check that all connections were correct before replacing the cover and connecting the external cables. I then took a deep breath and, holding the <delete> key down, switched on the power. The fan and hard disc motors ran up and the screen reported the following:

RISC OS 8192K

Error: Abort on data transfer at &038404A0

Now, this is where things did not go according to the manual – I quote from it:

The computer should report an "Address exception at &xxxxxxxx". This indicates that the 8Mb Memory Upgrade has successfully been fitted. A bug in RISC-OS means that new software must be loaded from disc before the new memory can be used.

I tried a lot of different things to try to get it going but without much success. I checked my watch: 90 minutes. (The manual says 30 minutes – I bit optimistic, I'd say.)

Off with the cover again

I powered down and removed the cover. I removed the screws holding the floppy and hard drives to their mounting bar to release the pressure on the p.c.b.s and by putting the disc directly into the drive rather than through the fascia, and resetting again, I managed to get the required Address exception error message and was able to boot the machine from the floppy disc. Three replacement modules loaded (a new Window Manager and Task Manager and WimpUtils) and the desktop appeared. Great! I performed a reset again to make sure that it was repeatable and not just a fluke and again it worked. The Task Manager confirmed I had 8Mbytes of RAM to play with, so I reloaded the CMOS RAM and copied the new modules onto the hard disc, changing my !Boot application so that they would be loaded automatically on subsequent power ups.

Success??

Wonderful! I had a working system. All I had to do now was to persuade the floppy disc drive to line up with the slot in the fascia. But could I do that? Not on your life! No matter what I tried, I could not get it lined up properly. There's only one thing for it... contact Atomwide. The next day I rang and explained the situation to Martin Coulson who was as anxious as I was to get to the root of the problem. He offered to pay me a visit at my earliest convenience.

Success!!

He duly arrived, bringing a spare memory upgrade kit and another ARM3 board. Using the original parts, he repeated what I had done and thankfully he got the same result. He commented that my Archimedes p.c.b. had some features that he had never come across before – it was such an old computer. He had to modify the MEMC board by removing the links that were fouling the main board and soldering a wire in their place. He then tried the spare ARM3 board which seemed to offer a little more clearance than the one I had tried. The overall result is that it all fitted more easily and it worked.

There was still a problem with the alignment of the floppy drive relative to the slot in the fascia but he eventually cured that by fitting a washer underneath one side of its bracket. The result is that it now all works. I'm not sure quite why I had so many problems, probably a bad combination of circumstances. Martin seemed to be suspicious of the original MEMC board – perhaps the flexing had damaged a track. Anyway it all seems to work OK now.

Known problems

Martin told me that there were one or two known problems with certain pieces of software when running with the extra memory. As I mentioned earlier, the Window Manager and the Task Manager themselves cannot cope with 8Mbytes, but since replacement modules are provided on disc, this is not a problem.

A more serious problem concerns the printer driver !PrinterLJ (I don't know whether the other drivers are affected also). It seems that if there is more than 4Mbytes of free memory available when the driver is started, it locks up the machine when you try to print. Similarly, some versions of the PC Emulator can't cope with the presence of the extra memory and give the ridiculous error message "Insufficient memory"! I understand that Acorn are looking into the problem but in the meantime it is possible to

work round it by 'wasting' the excess memory temporarily by defining a 4Mbyte RAMdisc!

And finally...

Would I recommend this upgrade? Yes, certainly. The cost is fairly high (£890 through Archive) but if you combine it with an ARM3, an already very capable machine is transformed into something very special. However, I feel that, of the two, the ARM3 upgrade offers the more significant improvement. Both the ARM3 and 8Mbyte upgrades will appeal particularly to R140 users whose machines would be transformed into pretty powerful Unix workstations.

The problems I had with the 8Mbyte upgrade were due partly to the fact that my computer is a very early 440 and partly due to the fact that I am one of the first people to fit the upgrade. I think I ought to have been able to fit it unaided and it was unfortunate that the parts I was using didn't physically fit. Martin Coulson has obviously benefitted from the experience and future users will have less difficulty as a result. However, the conclusion I have come to is that I would urge anyone else who buys the 8Mbyte upgrade to have it fitted by a Component Level Service Centre, or by Martin himself.

Finally, a special 'thank you' to Martin Coulson of Atomwide for coming to my rescue.

More comments

Alan Barclay writes: I have just fitted an Atomwide 8Mb memory upgrade and, as an electronics engineer, I am particularly concerned about the suitability of the hardware of these types of devices.

I note that the two MEMCs on the Atomwide board are both fitted the correct way up on the circuit board and not upside down as on some of the other boards! This means that there should be no airflow or heat dissipation problems. The MEMC board and the DRAM podule are connected with as short a length of ribbon cable as possible to avoid propagation delays and also has interleaved ground signals to ensure reliable memory operation at higher memory speeds.

As with the Aleph One ARM3 upgrade which I also have fitted to my machine, there is more than adequate power supply decoupling to provide error free reliability even when the machine is heavily loaded.

The memory podule contains eight of the latest 4 Mbit DRAMs which have very low power consumption. They are 80ns (fast) and could therefore theoretically run at 12MHz which is 50% faster than the existing memory system.

The manual is extremely clear and informative but Atomwide recommend that the unit is fitted by a Component Level Service Centre. In practice, however, I found that installation was straight forward provided that due care and attention is paid to the instructions. If you are cautious about dismantling your machine, note that Atomwide offer a free courier collection service and installation. A

Help!!!

• **CAD** – Does anyone know of a program which will produce perspectives/3D animations from plan/elevation information on the Archimedes? Elwyn Morris, Harwich.

• **First Word Plus driver for PostScript printer?** Three different people asked us at the Econet conference if there was a driver for First Word Plus for PostScript printers. Has anyone got one?

• **N.E.C. Multisync II** – Does anyone know how to get the M/s II working properly with the Archimedes? B.R.Miller, 77 Galloway Road, Hamworthy, Poole BH15 4JS.

• **Polyglot CALL** – Does anyone know how interpreted BASIC can call procedures compiled from Fortran, Pascal or C (see PRM p 1766)? Which available compilers of these source languages conform to the Acorn APCS? Contact Fred Hartley, 46 Hughes Road, Hayes, Middlesex UB3 3AP.

• **Prestel Adaptor** – Does anyone have any software that will enable the Acorn Prestel adaptor to run on the Archimedes or A3000? J M Gorman, Pontefract.

• **Stolen** – Watch out for a stolen 440 with Acorn monitor. Serial numbers: AKB20–1000792 and AKF11–1068841.

Help offered

• **D.I.Y. 4meg upgrade for A310.** Willi Langhans has sent us an article showing how to upgrade your A310 to 4M. We decided that it is not appropriate for publishing because it involves piggy-backing chips

and so on. It works OK if you know what you are doing and several folk around where Willi lives in West Germany will testify to that. It is available in photocopied form from the Archive office if you want to send us an A5 S.A.E. (i.e. 9" x 6" or bigger).

• **Optical Character Reader** – A piece of OCR software for the Archimedes is presently being developed which should be able to accept a sprite from any of the many available scanners (the higher the resolution the better!). If anyone is interested they should contact David Gilbert, 201 Upper Chorlton Road, Manchester M16 0BH.

• **Printing service** at very competitive prices for Archive members on HP LaserJet (B&W) or HP PaintJet (colour) up to A4 text, !Draw, !Paint or appropriate printer dump files from DTP, etc. Also, similar prints or print files from VHS or Video-8 tapes in B&W or colour. Contact Malcolm Davies at Marebrook Cottage, Newborough, Burton on Trent, Staffs DE13 8SP or via Micronet 028375345.

• **PSProlog** – Leslie Currell sent us a PSProlog file to allow the Symbol font from Impression and other PostScript fonts to be used with Prolog. I will get Adrian to put it on the monthly program disc. A

Language Column

David Wild

Prospero Pascal

Since I last wrote for Archive, I have received a press release announcing the latest edition of Prospero Pascal for the IBM PC and compatibles. For users of the Archimedes this is both good news and bad news.

The bad news is that Prospero Pascal has been improved significantly in ways that will make it a powerful rival to Acorns ISO Pascal. For the first time there is a PC Pascal which supports conformant array parameters. (All those years after they were provided on a Beeb with second processor!) Other new features include structured function results (allowing a function to return such things as strings), initial values (available on the Archimedes if you use static variables), numeric constants in any base and constant expressions. In addition to the language extensions, there is a library containing powerful graphics and menu-generating commands.

The other bit of bad news about the program is that Prospero are offering a school site licence for £240 which will allow the school to use as many copies of both Pascal and Fortran as they need. A single copy costs £240 for MS-DOS/PC-DOS and £320 for a version which will run on both PC-DOS and OS/2.

There is, however, a good reason for hoping that Prospero will be successful in selling their version to PC users. Unlike Turbo Pascal, for instance, Prospero Pascal conforms to the ISO standard except for the defined extensions. This means that much of the code will be transferable between one machine and the other without the need to take account of temperamental quirks. Because of this, there will be much less of an obstacle to the use of Archimedes in programmer training.

The really serious need now is for Acorn, or someone else on their behalf, to produce a good graphics library so that we have the equivalent facilities. It could be done using modules but would be even better using a library like library.lib.paslib and so avoiding the need for specific 'import' statements.

A very interesting addendum to the news about the new release is a comment about optimising compilers now being developed. The author claims that they are well on the way to producing a compiler which will actually produce optimal code for many programs and that coding critical routines in Pascal can actually be better than writing them in assembler! He also points out that tightly specified languages such as Pascal and Modula-2 will compile to tighter code than the more free-form languages such as C and Fortran. I suppose that this is similar to the fact that trains, (which cannot move sideways) can travel in opposing directions at a closing speed of nearly 300mph while only three feet apart, whereas aeroplanes, which can move in all directions, reckon that coming within 500 feet is a 'near miss'.

Compiler versus assembler

In the July issue of Archive there is a review of two games in which the reviewer is very dismissive of the fact that they are written in compiled BASIC

rather than machine code. While this may be responsible for the lack of speed it is not necessarily the case. At times, programmers do seem to assume that, because they are using a compiler which "speeds things up", they do not need to worry about the efficiency of their algorithms.

Some speed-up does come automatically because we do not have to think about such things as the lengths of names and the presence of "unnecessary" spaces in the code, but we do have to think carefully about the rest of the work. In one of the books which introduces 'C' to users of the Acorn machines there is a program to determine whether a number is prime or not. The way this is written I am sure that I could have beaten it, for a number of any reasonable size, with a program using the BASIC interpreter on my old Video Genie. To find out if 1001 was prime the 'C' program would do 62 times as much work as my BASIC program, and this factor would increase rapidly as the number grew in size.

In the article about the optimising compilers mentioned above the author tells of receiving a complaint that a particularly critical Fortran routine was 5% slower on a new version of the compiler. While he had to agree that this was true he was able to rewrite the routine, still in standard Fortran, so that it ran at 10,000 times the speed of the old version.

Optimising programs

I was very interested to see the article about optimising programs in the July issue of Archive. As a fully paid-up member of the pedants union I was horrified to see the suggestion about the use of 'GO TO' as an improvement. The alarm bells started ringing even more strongly when I saw the suggestion that you would need two copies of the program. This is extremely dangerous as one of Murphy's laws says that if two copies of a program need to be amended one of them will not be done – and it will not be the same as the one which missed being amended last time.

The even bigger worry though, was the suggestion that the amended function to search the array should have 'GO TO' statements leading to the code for dealing with 'found' and 'not found'. This is not a minor optimisation, but a fundamental redesign of the program. It is also contrary to the principle of giving each routine a well defined – and testable – job to do. My specification for this routine would be that it should accept a key (the "value") and return the index of that key in the array, or some indication that the key was not found in the array. As the real index cannot go lower than 0, this could be done by returning a value of -1 for the index.

The reason for wanting to limit the role of the function is that it could well be used in different places in a program with very different actions for 'found' and 'not-found'. Sometimes we may want to look up in the array purely for validation – if the value is in the array accept it, or (if not) issue an error message. At times we may need to extract other fields from the array according to the key supplied while on other occasions we may want to alter the array itself. The same search routine should cater to all these needs without needing to know what the calling routine is doing. The "optimisation" in the article could lead to considerable duplication of code.

Another problem is that the version in the article assumes a sorted list, which may well be desirable, but – because of other changes – it might be appropriate to change to a linked list instead. If we use a separate search routine this may be the only part of the program needing to be amended, thus lightening our task. A

Contact Box

• **Glossop Computer Club** – meets every Monday, about 8.30 p.m., at 'The Oddfellows', 69 High Street, West Glossop. One of the main topics of interest is the Archimedes.

• **Midland Area** Archimedes User Group is starting. Anybody interested in exchanging ideas and programs, should contact Neil Berry, 21 Pargeter Street, Stourbridge, West Midlands DY8 1AU.

• **W Sussex** – Anyone interested in setting up an Archimedes User Group in the Storrington (W. Sussex) Area? Contact Mr R.L.Williams, Badger's Lodge, The Street, Thakenham, Nr Pulborough, West Sussex RH20 3EP or telephone 0798-813855.

• **Wakefield** BBC User Group meets monthly at Holmfield House, Denby Dale Road. Contact Chris Hughes on Wakefield 379778, or write c/o 1 Wavell Garth, Sandal Magna, Wakefield WF2 6JP. A

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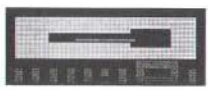
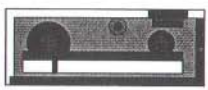


CD :0



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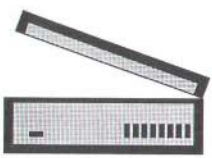

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Ground Control Teletext Adaptor

Daniel Aronovitch

The package that I received contained a receiver/teletext decoder (housed in a neat metal box), a manual and a program disc.

The hardware

The box is roughly the size of a 5.25" drive and contains a tuner unit, a teletext decoder and the main supply. The tuner is obviously not made by Ground Control but the rest is built with high grade components; the main IC's (Philips) are installed on supports and the printed board is of the epoxy kind. On the front there is access to three connectors: one for the aerial input, one to connect to the parallel Centronics port of the Archimedes (the cable is provided) and one which could be connected to a video composite monitor with sound. There is also an LED for power indication. The main switch is located in the back. The general construction of the unit is good.

The manual

The manual consists of an 11 page A5 leaflet. It contains the relevant instructions to connect the unit, to load and run the program and (something I appreciate a lot) a description of all but one of the SWI commands of the teletext module. You also find a description of the teletext pages and a short des-cription of some utilities that are on the disc. The manual seems perfectly adequate though I didn't understand all the download procedures (it could be that I tried to download programs under another standard than the one the unit is made for). Reference is also made to compressed satellite images but without any information on how or where to receive them; it might be more obvious to a British user.

The software

The disc contains two directories, the one for Arthur I won't comment on, the other is for RISC-OS and includes a copy of the manual in !Edit format and in First Word Plus. Two utility files are also provided: one is a library of teletext procedures, the other allows printing of saved pages as text – very useful indeed. All the programs are in well structured BASIC with meaningful variables. The application needs two modules, FormEd and Teletext which are located in a !System directory. Also on the disc is a directory of programs written for the old BBC which have nothing to do with teletext.

You can install the TTX icon on the icon bar the usual way and <menu> gives the option to quit. Select opens two windows: the main one is the page one and the other is a keypad plus the standard teletext options (index, reveal, hold) and a last page display option. The program runs in any graphic mode as the page is built as a sprite. Clicking <menu> in either window brings up a menu enabling you to:

- put teletext in stand-by (and back again) without closing the windows (useful to grab the screen page area with !Paint to save as a sprite).
- tune the receiver
- open a note pad
- download files
- save a page
- select one out of the four pre-selected channels
- edit the default configuration

To tune the receiver, you access a window, giving you three options. The first is to increment/decrement the channel number in a range 0 to 99 to 0 by clicking on arrows surrounding the channel number. Unfortunately, one cannot edit the channel number directly nor is there an auto-repeat on the arrows. At this stage came my first disappointment: I tuned to channel 4 and didn't get any kind of signal. After checking my cables and other possible faults I realised that the tuner only covers the UHF bands IV and V, i.e. from channel 21-69, the latter being the highest available on any system. So it would have been a better idea to limit the displayed range to those values.

The problem is that in Belgium we need tuners to cover a much wider range of frequencies. Thus with this equipment I'm able to receive only 8 programs broadcasting teletext out of 15 and, if I wish to use the unit as a television receiver, it's limited to 13 out of 27. As is always the way in these circumstances, the teletext program I find the best (the Spanish one) is not tuneable. I still have the option to replace the tuner and I will be discussing that with Ground Control.

The second option provides an automatic up search that stops whenever a teletext transmitting program is found – it also searches from channel 0 to 99. I think that an up/down search would have been nice. The problem with the channel range is easily overcome for the manual selection with a few amendments to the BASIC program but the search is part of the module and uses the one undocumented SWI! There is also a fine tune with a range –50 to +50 but it seems effective from -20 to +20; the step in frequency is undocumented. Once you have selected a channel, it is automatically attributed to the channel preselection you were in. There are four preselections available which, for use on the continent, is far too few. I haven't yet looked closely enough at the program but this could surely easily be modified. One can also save the channel preselection. The name of the station for each preselection appears as title of the main window but is not modified by the choice of channel. The titles are in the BASIC programs and so, for instance, if you select Eurosport in preselection one, the title of the page window will still be BBC1 unless you edit your BASIC. I replaced the names with the channel number.

The next option is notepad and there is not much to say about that except that you cannot save/load its contents.

The download option opens a window and then does nothing else. As I have already stated, I don't understand that function. The only broadcaster I know that provides PC software is the RAI and I suppose they don't use the same protocol as the BBC. The software pages are from 010 upwards and anyway the decoder refuses to load pages less than #100. I intend to discuss this with Ground Control too as I don't know any good reason for this. As it is, and as I understood it, the download function is really rather useless.

The default option allows you to name the preselected stations so that you can select them by name in the main menu. You can also select which page you wish to see searched for when you select a particular channel.

To select a page, you can type its number on the keypad. You can also point to a page number already displayed on a page – this is extremely useful. The last page selected is always stored and can be called back by clicking Last Page on the keypad.

The page decoding is nearly perfect and in use is smooth and easy. The font used in the sprite image is better than the mode 7 one. As the page is built as a sprite, the blink function is not implemented.

Bugs? I have just noticed a minor bug on the test page of the WDR/ZDF (Germany) teletext but it is extremely marginal. However, a big problem for a continental user is the lack of support of the national characters. In fact, the unit only decodes the English alphabet. This means that the German and the Italian texts are filled with symbol characters. The same would be true for the Spanish and French if I could tune in to them. Even on the test page on NOS (Dutch) which uses the same alphabet as English, mistakes appear. I understood from a conversation with Ground Control that it would be a matter of changing the SAA5240 chip for a 5241 but I may have misunderstood because I did that and it didn't change anything. Whether there is a solution remains to be seen – the manufacturers seem cooperative – but this could be a very serious problem for the continental or satellite dish user.

I said previously that there is the option to save a page in teletext format or as a sprite. If you save it in teletext, you can load it into mode 7, where you get the blinking but if it is a page where you have "revealed" some text, it will not appear in mode 7. I don't know if this is a bug or a fundamental problem but there again it is marginal. If you wish to use the 'load in mode 7' option, I suggest you add a pause line in the program so that the last line of your page is not over-written by the "space or mouse" message. To load a page in mode 7, all you have to do is click on the page icon.

The program to print pages as text is to be used from supervisor and works well. You have to use redirection if you wish to print to a file.

Conclusion

In conclusion, I would say that for a British user this is an outstanding product. It is easy to use, complete and cheap. It is fully multi-tasking even on a 1M machine as it only needs 128k. It is as-good-as bug free and if you wish to make improvements, you have all the information you need to do so.

For the continental user, things are a bit different. To achieve a perfect unit, you have to be prepared to do the following:

– replace the tuner unit by a general coverage one.
– modify the circuit as per the instructions given by Ground Control if you wish to use the unit as a television receiver, because of the different standard in image/sound carrier frequencies
– accept the lack of national characters (or hopefully modify the unit)
– accept that you cannot download the PC programs transmitted by the RAI.

However, now that I own and use the system I don't regret my choice. With all the restrictions, it is still a good value for money and I hope that with the help of the manufacturer I will find some solutions to the problems I have found. Also, I very much like the open philosophy of the software.

Suggestions

While using the unit – and I did so intensively – I had some ideas for improvement. Here are a few suggestions:

– at least 10 preselections
– the ability to ask for an automatic loading of the 10 or so pages (or up to a non-existing one) after the one you have selected. This could be useful for all teletext systems where a subject is treated over several pages.
– for the stations that group a subject in an index of pages, the ability to load the whole index range of a page.
– implementation of the national fonts
– allow access to pages under #100

STOP PRESS!

Daniel has just received version 5.01 of the software which has the following enhancements over the reviewed version:

– 10 channel memories
– pages down to #10 can be accessed
– tuning range is now channels 21 – 69
– the minor bug noticed on WDR test pages has been fixed

He says, "This new version brings the package to near perfection and I cannot find a negative word to say against it. I would recommend it without hesitation." A

PipeLine

Gerald Fitton

Corrections to July PipeLine

Two errors crept into the typesetting of last month's Archive. Somehow a caret, ^, was used instead of the vertical bar, |. The lines should have read:

Macro Files: For Homerton Bold you need: \CDF|i "Ctrl-Shift F1" |i "@@Homerton.Bold,10@@" |m.

Date: Try @D@ \Q|m \Z|m \BSS|m instead of June's erroneous combination!

Help wanted

Here is a list of questions to which I, and others, would like answers...

• What is the best way of formatting text and then printing in two columns?

• What is the best way of filling a slot so that it can be protected and will print as a blank? Before you suggest a space from the space bar, see what happens if you save your file and reload it – on my machine any slot containing only a space finishes up containing nothing (i.e. the space disappears). If you can fill the blanks with something then you need not worry if you forget to turn off the Sort – Multi-row records (see the Hints and Tips below).

• Does anyone have any ideas how to print every second page (automatically whilst you're having your tea) of a very long (e.g. 200 page) PipeDream document? What I (and others) are trying to achieve is a double sided A4 sheet containing alternate pages. Also, how do you print only, say, the 135th page?

• Is it possible to produce something like a card display from selected records using one line of the card display for each field of the database? I can see how to look up the first occurrence of a wanted record with one of the Lookup functions working on the key field (and then find the remaining fields with Vlookup), the problem is how to get the second and subsequent occurrences.

• John Jordan finds that his footer (which is a piece of text such as 'Page 2') is offset to the right of centre. What is he doing wrong or does everybody get this effect (I don't use footers myself)?

• C Oram wants to know if there is a way of using a key sequence to replace mouse dialogue boxes.

My everlasting calendar, which will be on the October 1990 PipeLine disc (see below), will work for all UK dates after 4 AD (8 AD was the first leap year). The change from the Julian to the Gregorian calendar is built into it but only for the UK. In the UK this change happened in September 1752. Different countries changed from Julian to Gregorian in different years from the late 16th to this century. If you know what I am talking about and you think you might be able to modify my UK everlasting calendar to match your own country's changeover, and you want to have a go, then please write to me offering your (free) services!

Hints & tips

• **Latest PipeDream** – The latest version of PipeDream 3 is 3.11. A free upgrade is available direct from Colton. Many, but not all, of the obscure and intermittent problems which you have written to me about are cured in version 3.11. If you have not yet upgraded then please upgrade to 3.11 and try again. If you have problems after installing 3.11 then please write to me and I'll see what can be done.

• **Outline fonts** – If you are having problems with your outline fonts either on screen or through the RISC-OS drivers then make sure you have the latest version of the Font Manager module. This is version 2.44 dated 01 Mar 1990. You can't be sure which version you have by double clicking on your !Fonts application because you get the message that is in the !Run file (this might be 2.42 or anything) so you must use *Help Modules and look at the Font Manager version and date. You should also have CLib version 3.50, FPEmulator version 2.80 and Colour Selector 0.52. Is there anyone who can explain the differences between different versions?

You should also have the latest RISC-OS printer drivers. If your RISC-OS printer driver sends out a blank page after every page it prints then you need to shrink the page length. Click <menu> over the printer icon (installed on the icon bar) and you will find a menu item Page size. Run the pointer through the arrow to the right and make the page length shorter. If you have not got a Page size option then you have an elderly version of your printer driver; most of the ones I have are version 1.12 dated 11 Jul 1989 but I have come across a version 1.14 of !PrinterLJ dated 29 Jan 1990 though I have not installed it yet (I'm still using the 1.12 version because I haven't changed my page size yet). You can find out your printer driver version by clicking <menu> over the installed printer icon and running the pointer through Info.

• **Underlining text** – The usual way of underlining text is by using <Ctrl>+PU but you can redefine the command <Ctrl>+U which abbreviates it slightly. You can save this definition by creating a macro or editing the special 'key' macro which is always called immediately after the 'ini' file. (See below under !Boot about my problem with 'key'.) You can apply this philosophy to any key sequence which you use regularly.

• **Graphics & line spacing** – PipeDream doesn't change the line spacing on screen when you change it in the Print – Line spacing dialogue box but it is changed when you print out. This means that if you include a large open space graphic, (in say slot A1) such as a frame around your text, the bottom of the frame may not be printed in the same row number as you think it will be from the screen display of the frame. This takes on a new significance now because it is possible to overlay graphics in PipeDream and the registration of two graphics entered in different slots will be exact only if you get the line spacing 'right'.

I have been experimenting and I still don't know the exact figure but, if you set the Print – Line spacing to about 12.75 point then large graphics will appear on screen more or less where they will when you print. I believe that the optimum point size for Acorn's Trinity.Medium text to go with this line spacing is about 11 point. Finally, I use the scale print option to print at about 110% and so get a printed point size of about 12 point on a document with a 14 point line spacing. Can anybody give me what they think are the best figures?

• **No room for numbers** – If your slot is not big enough to contain the whole of a number – including all the decimal places you have asked for – then you might finish up with a %. This is not a bug. You have to increase the width of the slot. Try making the slot very wide (use <Ctrl>+W and enter 20) and then gradually reduce the slot width until something

terrible happens! I had this problem with my everlasting calendar that needs only two significant figures (1 to 31) and no decimal places but the formula I was using kept on producing about 15 decimal places and hence a % in the slot! I finished up having to use the INTeger function to get rid of the decimal places. I thought it worked alright in an earlier version of PipeDream so perhaps the accuracy of some of the mathematical functions has been improved without me spotting it.

• **Blanks in databases** – Remember that the default option for sorting is with Multi-row records switched on. If you have blank fields you must remember either to turn them off or else fill them up with a non-printing character (but how to do this? See 'Help Wanted' above). A single slot containing a non-printing blank can be replicated throughout a marked block by using Block Replicate Right followed by Block Replicate Down; this might be a good way to create a database which will ultimately have a lot of blank slots (a so called 'sparse matrix') – but I don't know what it does to the size of the file or the memory used.

!Boot files

These days you don't need and shouldn't use <Shift>+Break (or Reset) to start up. In fact it is not a good idea at all. If you have a hard disc then the method described below is a better way of booting up !PipeDream.

Let's start by assuming that your hard disc is called HardDisc4 and that !System (which contains your modules), !Fonts and a new file (see below) called !Desktop are in a directory called SysApps (for system applications – ones that are needed for most applications) and that you have a directory called PipeDream (without the !) in which you find the !PipeDream application directory and other PipeDream related files such as dictionaries. You will have to modify the !Boot file below to match your own hard disc directory system. Double click on !PipeDream so that it is installed on the icon bar. Click select on the PipeDream icon to open a new PipeDream window. Now create the following file which will be called !Desktop by typing in the following, one line per command.

```
Filer_OpenDir adfs::HardDisc4.$
                          .PipeDream
Run adfs::HardDisc4.$.PipeDream.
                          !PipeDream.!Run
```

Now save this file from PipeDream in the SysApps directory using the Tab Format (i.e. not the default Pipedream format).

Open a new Pipedream window and type in the following !Boot file using one line per command:

```
Run adfs::HardDisc4.$.SysApps.
                          !System.!Boot
Run adfs::HardDisc4.$.SysApps.
                          !Fonts.!Boot
Desktop -file adfs::HardDisc4.$.
                        SysApps.!Desktop
```

Save this file as !Boot into your root directory using Tab Format.

Now press <F12> to get a * command and type in the following four * commands:

```
*settype adfs::HardDisc4.$!Boot
                                  Obey
*settype adfs::HardDisc4.$.SysApps
                          .!Desktop Obey
*Opt 4,3
*Configure Boot
```

At this stage you can check whether the !Desktop and !Boot files will work. Click <menu> on the PipeDream icon and Quit so that the icon is removed from the icon bar. Close all but the SysApps directory viewer containing !Desktop. Double click on !Desktop and you should install PipeDream on the icon bar and open the PipeDream directory viewer. (I keep getting the error message "File !PipeDream.key not found": does anybody know why? Captain J M G Lumsden has a similar !PipeDream.key problem.) If all goes well, you can close all but the root directory containing !Boot and double click on it. This !Boot file will call !Desktop.

By the way, although it doesn't say so in the PipeDream manual, PipeDream does recognise the Obey file type so, if you reload !Desktop or !Boot into PipeDream in order to modify them, you can save them in the same Obey format by just clicking on the OK button. You will now have to either switch off or reset the machine (your last <ctrl-Reset>?) and you should find that your modules and fonts have been loaded and that you finish with a screen showing the PipeDream directory. If you get stuck in the

system environment with the prompt * (perhaps because you have mistyped the file) and want to get back to Desktop, then you need type only Desktop at the * prompt, press <Return> and go on from there.

Printer drivers

I have received a PipeDream printer driver for the KXP1124 from I M H Williamson (available in the usual way) which does not do too badly at producing Greek characters. Remember to type in *Alphabet Greek in order to see the Greek characters in Acorn's !Chars in the system font.

Dirk Schdfer has sent in a driver (available in the usual way) for the Star LC24-10 which produces nearly all the characters of the Latin 1 set. The translation codes will probably work with all IBM compatible printers.

For those of you wanting to know what the output of the HP DeskJet looks like – send me a stamped addressed envelope and I will send you a photocopy of the DeskJet self-test. The quality does deteriorate slightly when photocopied but not so much that you can't tell how good the DeskJet is.

!Chars

This application is distributed with !PipeDream under licence from Acorn. Unless you have read the ReadMe file within the application directory (hold down <Shift> and double click to open a directory starting with a !) then you won't know that by clicking <menu> over the open !Chars window you can choose which font you want to display.

This ability to display all the characters of any (installed) outline font is useful for such fonts as the Electronic Font Foundry's MathsGreek font. You can then enter the characters into the text by using the mouse. Point to the character you want and click <select>: the character will appear in the PipeDream window at the cursor position. You can point and press <Shift> to get the same effect: I left my pointer in the !Chars window and when I typed an upper case letter I kept getting a funny character as well as my capital letter. I thought I had a bug!

By the way, if you find that your outline font is displayed in the !Chars window as if it is anti-aliased (i.e. poor definition) then double click on !Fonts and all will be well.

Improvements to PipeDream 3

Can it be improved? Well, yes! Every piece of software can be improved. Write to me and let me know what you would like as your one biggest improvement (or I'll take a set of related improvements) – no promises about whether we'll get the improvements you ask for.

Catalogue your discs

I have had an update of last month's programs from Francis Aries. The main program creates a Pipedream file showing details of the files in your directories: the data is loaded into Pipedream in Tab file format so that you have a database with each field being in a separate column. Francis includes instructions how to use it. You can get a copy in the usual way. He tells me that he will be happy to discuss any variations of the programs with you so if you send your letters (or discs) for Francis to me and I will bulk pack them and forward them to him.

Video tape catalogue

Albert W Kitchenside has sent me a suite of files which he uses to catalogue his video tapes. This is a well thought out application of Pipedream as a database and the suite includes macros which look for the files etc on the disc. The principles can be applied to such things as a bibliography or a list of telephone numbers. Again the files are available in the usual way.

Relational databases

Following on from June's article on this subject, Keith Matthews points out that there are advantages in including the $ replication-fixing operator in (nearly) all the slot references of this type of database. The big advantage is when you want to insert new records. Without the use of $ this would be most tedious. Keith has volunteered to help anyone who gets stuck, so send your letters (or discs) to me for sending on to him.

National Curriculum Files

If it was you who sent me this set of files (it contains the directory 1Edwards) then I'm sorry but I've lost your name and address and I can't find it anywhere within the files. Please could you let me have your name again. This database application of PipeDream will be of interest to those having to keep a record of the assessment grades of their pupils doing (I think)

General Science. All the attainment targets are detailed on the files such as NCSAT1 (for attainment target 1 which has 10 levels and that file alone is 8 Kb – there are 17 such NCSAT files) and the students are graded in a further 17 files one of which is 12 Kb long. The whole directory occupies about 160 Kb. I would like to include the files on the October PipeLine disc (see 'Quarterly PipeLine Discs' below) but I need your OK first.

Subgrams

M Hendrix offers Archimedes as a way of creating a large number of subgrams. Can you find a way, based perhaps on Paul Skirrow's method for anagrams (on the July 1990 PipeLine disc) of counting the number of subgrams?

PipeLine DTP – Fonts

Since my remarks about EFF's fonts not being PostScript compatible appeared in last month's Archive, Dr E Detyna has brought me up to date with a new catalogue. I quote "We have just concluded an agreement with Adobe Systems BV Europe. From now on we will be able to use their metrics file with our fonts, thus making them 100% PostScript compatible... all our existing customers can obtain PostScript compatible versions of their fonts simply by exchanging them free of charge".

I have had a good look at many of the EFF fonts, at both large and small sizes. I conclude that the latest versions of EFF's fonts are often better designed than Acorn's fonts. As an example, at certain unusual point sizes (e.g. 11 point) some of the Acorn Trinity.Medium global scaffolding links are noticeably wrong. Try a character with a flattish top such as a lower case 'w' followed by a character with a round top such as a lower case 'a' as in 'was' (I think that the effect I have noticed also depends on what the third letter is too.) The effect to the naked eye is that, at these unusual point sizes, Acorn's Trinity font looks ragged and EFF's looks smooth. After overhauling my printer in an attempt to cure the problem of Acorn's Trinity.Medium at 11 point and even changing my printer drum, I finally resorted to a 'high tech' approach. I found that, under inspection with a microscope with a graduated stage (i.e. a micrometer scale), the 300 dpi laser output produced a 'w' which is taller than the 'a' by a dot or so (about 3 or 4 thousandths of an inch). It surprised me that one dot on the height could make such a difference to the overall effect, perhaps I don't need new glasses after all!

Quarterly PipeLine discs

You are probably aware that all contributors to Archive give their services free. I write the PipeLine series because I enjoy it and I enjoy the correspondence which I get from you. However, over a period of time, the expenses mount up. The time has come to try to balance the books somehow. What I have decided to do is to produce PipeLine discs quarterly and charge for them. The first PipeLine disc is ready to send out now. It is based on the articles which have appeared in Archive and it includes all the PipeLine disc files which have appeared on the Norwich Computer Services monthly disc up to July 1990 and more besides.

I have written to all contributors and all who have replied have said that I can use their material in this way – I still have two contributors who have not yet replied which may mean that I have to remove a small amount of material from the disc. Colton Software have given me their blessing and will help ensure the accuracy of all the technical material.

The first disc, July 1990, is available from me at the Abacus Training address which appears on the inside back cover of Archive. The price of £5.00 includes UK postage. Overseas purchasers should add a bit more for the postage. The next issue which will be available at the beginning of October, will contain, amongst other things, an everlasting calendar (but see 'Help Wanted' below). I hope that advertisers will take advantage of the unique opportunity to include in a directory some demo which shows off their products. Single 'Small Ads' (and they must be small – no sprites please) from genuine non-commercial PipeLine disc purchasers will be inserted (subject to space limitations) free of charge.

Disc copies of PipeLine files

Disc copies of all the files mentioned in this article except the National Curriculum and Calendar files are available from Norwich Computer Services by buying their monthly disc (£3) and they will all, hopefully, be on the (£5.00) October PipeLine disc.

Contributions

Problems for the 'Help Wanted' section as well as contributions which show how to do something interesting or difficult will be most welcome. If you have a problem or an extended example, I would prefer it on a disc. That way you can save giving a complicated descriptive explanation, there will be no doubt as to what you mean and, with your permission, I can make the problem and its solution or your extended example available to others on disc more easily than I could do otherwise. A

Introduction to 'C' – Part 9

Chris Dollin

I'm sorry, I'll re-alloc that again

In the last article we learned about *malloc* and *free*, which allow the C programmer to grab pieces of store and then return them once they are finished with. In this article, I shall add another function to our store-allocation repertoire, and discuss the relationship between pointers and arrays.

A little more, a little less

In order to make use of *malloc*, you must know how much store you require first. This may seem obvious but there are occasions when you don't know how much store you will need, for example, when reading in a line of characters. Let's consider this example in more detail.

We write a procedure *readline* which will read in a line from an input file and deliver it as a freshly-allocated C string. We shall insist that a line of any length be allowed, just so long as there is room for it in the machine. Clearly, the thing to do is to allocate a small string to start with and then grow it as necessary. Thus:

```
#include <string.h>
#include <stdio.h>
#include <stdlib.h>
char *readline( FILE *source, int hint)
  {
  int ch, i = 0, limit = (hint > 0 ?
                          hint : 1);
  char *result = (char *) malloc(
                        limit + 1 );
  while (ch = fgetc( source ), ch !=
                  EOF && ch != '\n')
    {
    if (i == limit)
      {
      char *new = (char *) malloc(
                  (limit *= 2) + 1 );
      memcpy( new, result, i );
      free( result );
      result = new;
      }
    result[i++] = ch;
    }
  result[i++] = '\0';
  if (i < limit + 1)
    {
    char *new = (char *) malloc( i );
    memcpy( new, result, i );
    free( result );
    result = new;
    }
  return result;
  }
```

The *hint* argument suggests an initial size to allocate for the string. If it is less than *1*, we force it to be *1*, so that the rest of the code makes sense. We allocate a preliminary buffer one byte longer (so that we'll have room for the final *'\0'* character without more tests).

Each time we get a character, we see if there's room for it in the buffer. If not, we allocate a new string (twice as big, plus one for the final zero byte), copy the characters into it and free the old one. We double the size so that we don't call *malloc* very often. If we just added *1*, we'd be calling it for every character past the initial *hint* size and *malloc* is not that cheap!

Finally, we put in the trailing *'\0'*, to make *result* look like a C string, trim it if it's bigger than we need, and return it.

The whole thing is rather clunky and I hope you have already decided that you'd write a separate function for the *malloc – memcpy – free* operation – after all, I've already written the code out twice! Fortunately, there's no need: the third member of the store allocation family, *realloc*, does just that. Here's *readline* rewritten using it.

```
char *readline( FILE *source, int hint)
  {
  int ch, i = 0, limit = (hint > 0 ?
                          hint : 1);
  char *result = (char *) malloc(
                        limit + 1 );
  while (ch = fgetc( source ), ch !=
                    EOF && ch != '\n')
    {
    if (i == limit) result = realloc(
          result, (limit *= 2) + 1 );
    result[i++] = ch;
    }
  result[i++] = '\0';
  return realloc( result, i );
  }
```

realloc takes two arguments: the store to re-allocate and a new size for it. The new size can be bigger or smaller than the old size. The result is *NULL* if not enough store is available (an issue that the code above ignores – be warned) Otherwise, the result would be a piece of store at least as big as the second argument and containing a copy of the contents of the first argument (up to the limit of the minimum of the old and new sizes).

If the old store was actually big enough already (the store manager might pad all requests to a multiple of *8* bytes, for example), then you may get it returned as a result. If it wasn't, then a new piece of store is returned and the old one is freed. Consequently, a *realloc* must be treated as totally trashing the original piece of store; any other pointers to it become invalid.

You won't need to use *realloc* as often as *malloc* but it's very useful when you need it. (A program I've written for my gainful employment has buffers all over the place which are extended and shrunk using *realloc*.)

One final point to watch out for. The ANSI standard says that the first argument to *realloc* can be *NULL*, in which case, it behaves like *malloc*; and that the second argument can be *0*, when it behaves like *free*. In the latter case, the result may be *NULL* (there being no 0-sized objects in C). This makes certain functions easier to write, because the case of no objects is no longer a special case. However, older C libraries may not support this use, so take care.

Pointers and arrays

It is easy to become confused about the difference between pointers and arrays in C. An **array** is a contiguous collection of objects of the same type; they are created by declarations such as:

```
int ai[100];    /* Array of 100 integers */
char ci[42];    /* Array of 42 characters */
int *x[27];     /* Array of 27 pointers to
                                integers */
```

A **pointer** is a handle on a particular **single** object; they are created by **expressions** such as

```
&ai[17]     /* Address of 18th element of ai */
&ci[0]      /* Address of zero'th character of
                                ci */
```

However, when the name of an array appears where a value is required, it is converted ("decays") into a pointer to its first element. Furthermore, if p is a pointer to an element of an array, then pointer arithmetic can be used to get at the other elements of the array.

malloc effectively delivers **pointers to arrays**. Hence, there is no need to do anything special to create one-dimensional arrays using *malloc*; you just allocate store for enough elements of the appropriate size (using *sizeof* to determine how much space a single element requires).

Note that the difference between arrays and pointers can manifest itself in these two ways (among others):

• *sizeof(A)*, where *A* is some array type or object, returns the number of bytes needed for the whole array (i.e. the number needed for a single element multiplied by the number of elements); *sizeof(P)*, where *P* is a pointer type or object, will deliver the number of bytes needed for the pointer itself (probably 2, 4, 6 or 8; on the Archimedes, always 4).

• When using independent compilation, you cannot expect that a program will work if some external object is declared as (e.g.) *int x[N];* in one file and *int *x;* in another. *Be warned!*

Exit

There will be a gap before the next article, as I will be busy preparing for an important demonstration for my Paid Work. Please let me know through Archive what topics you would particularly like me to address. A

Hardware Column

Brian Cowan

Cumana Removable Disc Cartridge Drive

After much aggravation, I have finally managed to get hold of these remarkable disc drives from Cumana. I was beginning to think that the company was going out of business as my telephone calls were not returned and my letters remained unanswered. When being fobbed off by yet another receptionist, I lost my temper – that did the trick. I was immediately put through to someone who could help me and about a week later a package arrived containing two drives. What was particularly annoying was that it was Cumana who had originally approached me to ask if I would evaluate the drives.

The technology

The discs are 5.25 inches square and they look like overgrown conventional 3.5 inch discs, in a rigid plastic case. There is a window which opens when the disc is inserted in the drive, so the discs are fairly well protected. The medium is a floppy disc but it can store a massive 20M of data. Such a high capacity is obtained by having very close tracks – 666 tracks per inch, in fact. The very precise movements of the read/write head are effected by a servo mechanism which locks on to analogue tracks between the digital tracks. The formatting process lays down the tracks on the discs, though they are usually supplied ready-formatted. The discs are manufactured by Data Verbatim, now part of Kodak, and the drives are from Technology Corporation. I am not sure if there are other sources for the discs.

SCSI interface

The drives communicate with the computer through a SCSI interface. Cumana have decided to adopt the interface from Lingenuity. My drives came with Lingenuity interfaces and these were the ones I installed in my machines. The interfaces contain the SCSI filing system software, which is automatically loaded into the computer on power-up. When everything is installed properly, a SCSI disc icon appears on the icon bar.

Installation

I am afraid I had a little difficulty in setting up my first unit. Physical installation of the SCSI podule was trivial but getting the drive up and running was not. Part of the problem was that I had two different products from different manufacturers. There was an instruction booklet for the SCSI interface and a two page leaflet of details about the disc drive. It was quite clear what connected to what, but my downfall was in reading the instructions. The SCSI ROM provides a number of new *Configure commands which store information to CMOS RAM. I tried to configure my machine according to the instructions (which contained printing errors) but to no avail. The trouble is that wrong configure commands are not necessarily overwritten by the correct ones. Thus, erroneous entries remain, to do possible harm. At one stage I had two SCSI drive icons appear on the icon bar but neither would respond!

I had previously examined the contents of the floppy disc which accompanied the Lingenuity SCSI interface. The main things it contained were the latest version of the relocatable modules contained in the podule ROM, although I was pleased to discover that my ROMs were fully up to date. There were various BASIC programs including one called SetupSCSI. Eventually it dawned on me that it was possible for a program to interrogate the devices hanging on the SCSI bus and configure the machine accordingly. When I looked at the contents of this program I discovered it did precisely that. It seemed a useful program but unfortunately there was no mention of it in the Lingenuity manual. I did, however discover a text file called SCSI on the disc which explained the contents of the disc. Why not call it "ReadMe" to make it more obvious?!

Second attempt

I should point out that I got to this stage by thinking, certainly not by reading the printed documentation. Anyway, I had one further interface and drive to install on another machine so now I was more confident in doing it successfully and without wasting too much time. I placed the interface card in the computer, plugged the drive into the interface, and switched on. I ran the SetupSCSI program, and... success! The SCSI drive interface icon appeared on the icon bar and clicking on this illuminated the drive LED's and spun the disc.

The Lingenuity booklet stated that the discs were not formatted. So the first thing I did was to format a disc. This took quite a long time, which is understandable considering the density of the tracks. However I later discovered that the discs were already formatted and verified. The problem was that the SCSI drive instruction booklet was written assuming the owner was using a Winchester hard disc, not other SCSI devices.

In operation

I was eager to try the drive in earnest. I dragged various files around the desktop screen from one drive to another. Most things went well. The filing system and filer made the Cumana drive appear just as any ADFS device. One of the first things I wanted to do was to back up my internal 20M hard disc. While playing around in the desktop I dragged the 5M DOS partition from the Winchester to the SCSI disc cartridge. This caused the first machine hang-up. Then, from within the desktop, I tried to back up the Winchester by "selecting" everything and dropping it on the Cumana. Once again it hung up when it got to the DOS partition. Eventually I left the desktop and using *Copy the backup was successful. It took something like fifteen minutes, but real speed trials follow later.

Returning to the desktop, I inadvertantly tried to access the drive with no disc inserted. This caused the machine to hang. One further thing which worried me was that there was a fan at the back of the unit to provide ventilation. This was sucking air out of the case. There was one air inlet underneath, but air (and dust) was being sucked in the disc aperture and over the exposed disc surface – there did not appear to be any screening or sealing of this sensitive area.

Speed tests

I ran two sorts of tests. Firstly I measured the bare data transfer rate using a program written by Mike Harrison. Since I found that the speed of the Cumana units was between that of a hard disc and a floppy, I have included comparisons with both.

	20M Acorn Winchester	Cumana Cartridge	ADFS Floppy Disc Drive
Mode 0	279	150	24
Mode 15	285	149	24
Mode 21	76	142	24

It should be emphasised that the Winchester drive was one of the old original Acorn units. I have also run the test on a modern Oak 40M drive with an 18.4 mS seek time. The mode 0 and mode 15 transfer rates for that drive were both 390 kbytes/s. The conclusion is that the Cumana unit gives between one half and one third the speed of a conventional fixed disc drive. (Compare this with the Oak removeable drive below at 650 kbyte/s.)

I next tried the "practical" test of copying the contents of the Applications Disc. On a fast Winchester this took about 20 seconds, to be compared with 80 seconds for the Cumana unit. *(I think that's Apps Disc 1 – I used Apps Disc 2 for my tests so there's no direct comparison. Ed.)*

Conclusion

You must ask the question "what would you use these drives for?". I don't think they are suitable as a replacement for conventional fixed hard discs – for many applications they would be too slow. However, for running CPU-intensive applications they are fine. For back-ups and storing valuable data they are ideal. For example, I have recently been trying to use TeX, the computer typesetting program. It has about 8M of code, so only dedicated users would want to install it on a normal Winchester but this is an ideal application for these drives.

There is, however, a real problem concerning the fact that there are two products from different companies. The documentation from Lingenuity did not relate to the Cumana unit and the Cumana instructions were rather sparse. For instance, there are two tabs on the discs – presumably for write-protection – but there was no information about this, and I still do not know why there are two such tabs! Incidentally, I also ran the drives from an Oak SCSI (sixteen bit) interface. There was no perceptible change in speed, the bottleneck being in the drives. However, there were none of the problems with transferring large files – nothing I could do would cause the machine to hang up. I am planning on keeping the two drives and interfaces but if I buy any more drives I will probably use Oak interfaces for them rather than the Lingenuity ones.

Money matters

The price of a single drive unit is £529 (ex VAT), and the discs cost £85 for a pack of three. Also there

is the cost of the SCSI interface and Cumana were charging £179 + VAT for the Lingenuity card. There is no other product which even remotely matches this one.

Other solutions

There is another removable hard disc system on the market – available from Oak Computers. They use SyQuest drives which have removable hard discs with 47M capacity. They really are hard discs rather than floppies. The cartridge is again 5.25 inches square but it is about twice the thickness of the Cumana discs. They are transparent and you can see the aluminium disc inside.

Running the same speed tests on these drives indicated that their performance was the same as a normal fast hard disc unit (650 kbytes/s). The drawback, however, is the price. The drives cost in the region of £1,000 (£1190 inc VAT through Archive) and the discs are about £100 (£105 inc VAT through Archive).

For those prepared to wait, there is a new drive coming from Citizen, which appears to be the ideal solution. They will provide 20M capacity on a 3.5 inch disc. The technology, I believe, is "floptical". That is, magnetic read/write, but a laser servo-driven unit to track printed circular tracks on the disc. The special feature of these drives is that they will also read and write conventional 3.5 inch discs. The cost of the drive should be nearer that of the Cumana unit, so most attractive. Nevertheless it may be that the specially printed discs could be quite expensive.

Bottom line

Whatever my complaints about the Cumana/Lingenuity system, I have been using it for about two weeks and I am quite happy. I hope the bugs will be sorted out but, even so, this is a really useful product. A

SCSI Column

Paul Beverley

Removable hard drives

Oak have now added a 42M removable hard drive to their range of SCSI products. It sells for £1185 + VAT (£1190 through Archive) including a podule and is a true hard drive, not the slow "Bernoulli" type. Its speed is virtually the same as the conventional SCSI hard drives (650 kbytes/sec, access time 30 millisecs) whereas the 20M ones from Cumana are only about 150 kbytes/sec.

Although these drives are more expensive than a conventional external drive (compared with a 45M at £655 Archive price), the advantages are obvious. Because you can remove the data cartridge, it improves security and portability. The cartridge can be locked away in a fire-proof safe (or other suitably safe place such as under your mattress!). If you have a situation, say in a university, where you want to move from machine to machine, you can do so taking your 42M of data with you. You could also use it in a situation where you want to log a lot of data but don't need to have it all accessible at the same time. For example, you could get 546M of storage by buying a removable drive plus 12 extra cartridges for £2450 compared with a 512M drive at £3990 or a slower magneto-optical 560M drive for £4890.

Improved SCSI software

Oak have also just released their 512M SCSI drive which is actually a 640M drive of which only 512M is currently being used. The reason for this is that Acorn's FileCore routines can only access 512M per logical drive. However, Oak are putting the finishing touches to a new version of their SCSIFS which will allow you to partition drives over more than one SCSI drive number. This means that you will be able to use all of the 640M drive by dividing it into two (or more) separate logical drives. This has other advantages, even on smaller drives, because partitions can be individually write-protected and you are better protected against corrupted directories and free space maps as only one partition would be affected.

New drives from Ian Copestake Software?

Those of you who saw Ian Copestake's cryptic advert last month (page 6) may well be wondering what he is up to... so are we! Ian is being very cagey about it and not saying what he is about to spring on us. I think it must be SCSI and my guess is that it may be these optically aligned hard drives... but we'll have to wait and see. There is no advert this month, so they are obviousy not quite ready yet.

Archive hard drive shake up

The range of hard drives available through Archive, both ST506 and SCSI, has grown considerably to the extent that the whole thing is very confusing to the prospective purchaser. Also, it is very expensive for us to maintain stocks of all the different drives. So we have decided to rationalise our policy on the hard drives that we sell. From now on, we will only be stocking Oak Computers' hard drives. Computerware are no longer supplying drives anyway and we were selling so few Lingenuity drives that it seemed better to deal with one supplier and concentrate on trying to get better prices by increasing the amount we buy from them.

New bridge mounted drives

We were tempted to keep Lingenuity's A3000 podule on our price list as this is an internal podule and some people don't like the idea of a metal box clamped to the back of the computer which is Oak's solution. However, the Lingenuity podule is slower than the Oak equivalent and Oak have an alternative solution. You can now have a hard disc mounted in a metal bridge that goes over the A3000. It goes far enough back to ensure that the podule in its metal housing does not stick out any further than the monitor. If you want a bridge-mounted drive, they work out at just £40 more (at Archive prices) than the normal external A3000 equivalent drives. A

DTP Column

Ian Lynch

Things are really beginning to motor in the Archimedes DTP world. I have had a press release from Computer Concepts outlining several Impression and general DTP enhancements, a Laser Direct printer on trial and Beebug have sent me a complete review copy of Ovation so I will set aside most of next month's column for this.

Impression latest

Stuart Bell of First Word Plus fame has written making several points having just started using Impression 1.03 bought in late June. He has experienced some crashes and the odd less serious bugs. In fact version 1.05 has now been available for several weeks and is more stable, so if you have an earlier version you can up-grade free. A more definitive upgrade, version 2.00, will be available around September time and this will also include additional features and a new manual – presumably in response to the release of Ovation and Tempest and as a result of comments from users and reviewers. Existing users can get the software upgrade free but the new manual and some extras such as extra clip art and Pembroke outline font will cost £20, presumably because of material costs. Stuart is very pleased with the import of First Word Plus files, something not currently implemented in Ovation.

Maurice Edmundson writes with several criticisms of Impression. Specifically, he dislikes the organisation of the manual, which has been criticised by others. Ovation's manual does seem clearer and easier to follow. As stated above, a new manual for Impression should be forthcoming soon. Lack of edge rulers is another feature lacking in the current versions, which Maurice considers essential and these are promised for 2.0. Overall, he thinks Impression may offer too much for the new user and fall short of the needs of the more advanced professional. In July's Archive (pp 28/29) Computer Concepts advertise Impression Junior which does not need a dongle, is file compatible with Impression and less complex. With this and the enhanced 2.00 perhaps they will please everyone – somehow, I doubt it!

When printing landscape on a 24 pin printer Maurice experiences a string of line feeds before printing starts – does anyone have any suggestions why? I can only suggest looking at the top margin settings on both the printer driver and document. Clicking "Show print borders" on the preferences dialogue box (Impression icon – MENU – Preferences) may give a clue to what is happening.

Which system?

Stuart Bell points out the advantages of more memory, a hard disc and the potential of ARM3. On this point, I am frequently asked what system I would recommend for home users of DTP. The problem is that there are so many combinations and it can become quite confusing.

For those on limited budgets (and who isn't these days) an A3000 with 2M of memory and a standard resolution colour monitor with Impression, Ovation or Acorn DTP will do most things required. The

extra memory allows you to set up a RAM disc to hold the system folder and fonts (don't forget to double click on these in the RAM disc window to establish the "system paths") with the application and files being resident on a floppy. You should still have enough room to have a decent font cache and multi-task Draw, though Impression being the most compact will leave most space.

Although Computer Concepts recommend a multi-scan monochrome monitor, home users may find a standard resolution colour monitor a better all rounder since it is unlikely that their computer will be used exclusively for DTP. Does anyone have prices and models of multi-scan mono monitors that they would recommend? *(We sell an Eizo 21" at £1050! Ed.)*

Printers provide another problem. 9 pin dot matrix printers can be bought for under £150 and will give reasonable results but are noisy and very slow. 24 pin printers improve speed and quality considerably for an extra £100 or so. Ink jet printers such as the Deskjet which has already been mentioned in the column give good quality and perform quietly but are slow in comparison to most laser printers and cost between £500 and £1000. Laser printers cost upwards of £1000.

Laser Direct

For those with a slightly larger budget I can strongly recommend Computer Concepts Laser Direct. I tried this on an A420 with and without an ARM3 upgrade. While the ARM 3 makes a significant difference, the printer is also extremely fast even on an ARM 2 and will print pages close to the maximum 6.5 page per minute limit of the printer in many cases. A colleague printed a 50 page Impression document in about 10 minutes, with each page different and in crisp 300 dot per inch quality.

This printer easily out-performs a Brother HL-8 (HP-laserjet compatible) costing half as much again. An Apple LaserWiter (PostScript), costing more than 3 times as much, is much slower and no better in output quality. What is more, if we compare Laser Direct on an Archimedes to (say) a PostScript printer and IBM PS/2 running under DOS with font cartridges, etc the whole DTP package on the Archimedes would comfortably out-perform the DOS system and cost less than just the PostScript printer. The only draw back is that, at the moment, Laser Direct will only support RISC-OS applications, though Computer Concepts say that they will produce Epson emulation when they get time – a PostScript compatible interpreter is under development. At the time of writing, I am not sure if the Laser Direct is available for the A3000, but in principle I can't see why it shouldn't be.

Laser Direct is actually based on the Qume Casio liquid crystal shutter array engine. Basically, this means that it is not strictly a laser printer at all but uses ordinary light and an array of liquid crystal shutters to produce an image. This gives results which are as good as a laser printer but the engine has fewer moving parts and should in theory be more reliable.

Running costs are also claimed to be less owing, at least partly, to a less wasteful system for replacing toner. Instead of using the Qume printer's own processor and electronics (laser printers have there own dedicated processor for controlling image formation) Computer Concepts have produced a board which uses the ARM and the Archimedes' RAM to constitute the image very much more quickly. You really need at least 2M of RAM to do this, but of course you are saving on printer RAM at the same time.

Computer Concepts have also re-written the font manager software in order to process text images very much more quickly, but have sensibly provided a switch so that you can switch back to the Acorn software if anything turns out to be incompatible. I did, in fact find one page which wouldn't print with the "fast text" button on, but this printed fine without it albeit rather more slowly. (Still a lot, lot faster than a LaserJet!).

Other clever ideas such as data compression to fit several pages into the extra 1M of RAM in the Archimedes (a full DTP page is about 1M as a bit map) mean that the computer can be constituting pages while the printer prints them, speeding things up further.

The printer is also more compact and takes up less desk space than most laser printers. To get the page image from the computer to the printer Computer Concepts provide a podule (so the printer port is free to attach a Dot matrix or other printer if you want) and cable. This interface provides the high speed data route from computer RAM to the print engine.

If you need really high quality output, the Canon LBP 4 can be driven from Computer Concept's interface and can provide 600 dpi though an Archimedes with 4M of memory might well be needed. A page at 600 dpi will take about 4 times as long to print so without Laser Direct you would need a lot of patience. The Canon printer also has standard LaserJet emulation so you could also use it to print non-RISC-OS applications. They can be bought for around the £1000 mark if you shop around and Computer Concepts sell the interface and software for about £250 so this combination is a bit more expensive than the Qume.

If all this is not enough, Computer Concepts will soon be releasing a 400 dpi version of ScanLight with software which will enable a sheet to be scanned and printed directly using Laser Direct, providing the user with a home photocopier. I really can't praise this innovation enough. At last we are getting applications which really use the ARM to its limit and, as far as I am aware, do things which PC's and Mac's just can't compete with.

Hard discs

A hard disc does make life easier – particularly if you have lots of files to organise – but to start with, this is less likely, so a new user would probably get away without a hard disc for a few months leaving time to save up for one. You never know, prices of larger capacity drives may possibly have fallen by the time you build up enough files to really need one.

The problem with the A3000 route is that, if you decide you want to upgrade significantly to video digitisers, scanners, ARM3, etc. Some upgrades such as ARM3 are not possible because the ARM2 chip is soldered into the circuit board. Others make the price differential between 400 series machines and the A3000 less significant, particularly if you also require several podule slots.

Obviously a SCSI interface gives possibilities in addition to the drives you attach to it. If you really think you will be expanding beyond the capabilities of an A3000 then buy a 410 and put an extra 1M of memory in it or look at one of the deals which gives a free or discounted upgrade. I'm sure Paul will be able to help here. *(Yes, except we don't do any part-exchange. Ed)*

Tail-end snippets

• **Ovation** is copy-protected in order to limit the number of times it can be backed up or copied. The idea is that you can install on your hard disc and a floppy back up and that's it. Beebug do say that genuine accidents such as a hard disc crash, which cause problems will be dealt with sympathetically. I can see potential problems with this in an educational environment! Tempest will be released in September as most of Clare's customers in education will be on holiday until then. It is likely that Tempest will have serial number identification but no hardware or software protection.

• **Page length in Acorn DTP** – Alan Wilburn asks if there is any way of increasing the page length in Acorn DTP beyond 420 mm? Anyone know? Impression seems to be OK with 2430 mm and Ovation with 913 mm. Incidentally, !Draw can manage A0 or 840 x 1187.

• **Recommended reading** – Stuart Bell recommends 'Newsletters from the Desktop' by Roger C Parker, Ventana Press, ISBN 0-940087-40-5 £21-95 as a book about DTP (rather than a book about specific PC software!). Impression comes with a book called 'DTP at a glance' which is also a useful start for beginners.

• **Impression text flow** – Ray Dawson has had trouble with flowing Impression text across pages. (Help!! Archive Vol 3.10.) As long as you flow into a newly created frame, you should have no problems (I didn't on 1.05), but Impression will not flow text into a frame once you have typed into it. It is best to plan how you want your layout first. If the worst comes to the worst, save text as text files and then import it back into the desired frame structure.

• **Greek3 font** caches very slowly because its internal name is not the same as the name in the !Fonts list so it is never cached. The simplest way to remedy this is to alter the name Greek3 to Greek in the !Fonts directory. Alternatively use !FontEd to alter the internal name.

• **EFF Fonts** – I have recently received the latest Electronic Font Foundry catalogue. It is growing and the range of fonts available is very impressive. The MathGreek which comes in standard and oblique typefaces should make maths and science formulae easier to include. I would recommend any DTP

users to get a copy of the catalogue. The address is on the inside back cover of Archive.

And finally...

Finally, many thanks for all the contributions and letters. I am having more difficulty in personal replies now as the numbers have increased and I am pressed for time at work at present. Please keep things coming and I'll do my best to include as much as possible. A

Agenda Portable Computer

Simon Anthony

This is my second attempt at writing a review of the Agenda. Paul sent back my first effort saying that it sounded like the pitch of one of their salesmen! After some objective re-consideration I have come up with some irritating features but I still love the machine almost unreservedly. Anyone who uses this machine will find it very hard not to carry it everywhere with them.

What exactly is the Agenda? (For a start it is badly under-advertised!) It can be considered as an alternative to a Z88, Psion Organiser and Sharp memory organiser all in one small box. Thinner, slightly wider and longer than a Psion, it fits a pocket very much better than any rival – but the full set of functions they permit is yet to be implemented. The spreadsheet and communications aspects can be expected one day but, as yet, the Agenda is mainly a Wordprocessor, diary, electronic filofax and multiple alarm clock. (With the aid of a £25 BASIC PC-program, code can be written, compiled and downloaded to make the Agenda run just about anything BASIC can achieve – or so they say.)

The base machine (at a rather hefty £200 odd) has 32k of memory which is expandable to 64k internally by sending the machine back with more money. Any number of rather bulky plug-in 32k cards (one at a time) can be used as a supplement but this may prove impractical for main memory storage. Agenda sales suggest their main use is as a memory backup 'should the memory become corrupted'. This has happened to me several times on early machines but not once since I bought a card. Two ram cards are needed to backup a full 64k memory's worth. You can use all the functions of main memory on the Ram-card, albeit slower.

I use the Agenda primarily as a portable note pad text entry system because its small text window does not allow anything like easy use of the fully implemented internal wordprocessor. I tend to transfer my text to the Archimedes for formatting and final editing. The main selling point however is the small size, as it is easy to use it at work, at home, on the bus or even walking in the garden.

The Agenda has a mass of rather daunting buttons but, fear not, only a very few are needed. Seven of the 65 to be exact. These fall ergonomically under the fingers of the right hand (the thumb controls three). They are pressed in groups or 'chords' with the keyboard being read only when the last key is released. This keyboard polling allows the fattest of thumbs or toes to stab at the individual letter keys and even if five are pressed, only the target last one will be typed! (Psion please take note). The seven micro-writing keys are unmarked and, at first glance, the task could appear impossible but to get up a decent speed, micro-writing is a must – a joy in fact.

The manual's instructions help to make the learning curve remarkably short and steep. It takes an absolute beginner about an hour to reach an average QWERTY typing speed! This may sound like a wild exaggeration but I have proved it several times.

The 'dead flesh' black rubber keypad is almost totally silent but quick and responsive. I have had to shave the edges from some keys with a razor blade as they can get caught under the front plate.

The filing system has 26 alphabetical 'drawers', each capable of holding any number of records up to the memory limit of the machine. The 'A', 'D', 'P' and 'Z' drawers each have one extra use: 'A' can hold files for an 'Action list', 'D' holds the 'Diary' functions (automatically dated headers, chronologically ordered access), 'P' and 'Z' hold set up function files for printers and the Agenda base functions such as line and page length, micro-writing key initialisation etc.

The machine comes with a battery recharger – a full charge will last for well over a week even with continual use. If it is left unattended and an alarm goes off, the beeping will drain the battery eventually but

the Agenda can be left in 'switch off and shut up' mode to avoid this – a must for concert going! When it is turned back on, any missed alarms will show in the window whether they beeped at you or not. The reminders must be cleared before you continue. I use this alarm function for Radio and TV programs which repeat each week – the first of that day's list of alarms or diary entries comes up each time a day is selected in 'Diary' mode. Pressing 'File' steps through them chronologically showing the time on the 'Finding Line'.

Unfortunately, no communications packages are available for the Agenda so I have written my own. It uses the file conversion routines from Archive and a set-type facility. The Archimedes takes text serially from the Agenda's RS232 at 9,600 baud (it could have been done via the parallel output but I only bought a serial lead) and puts it as a series of headed files (date stamped if they are diary files) joined together into one file onto a RAM disc on the Archimedes. (Set up the RAMdisk to at least 32k.) From there, the program copies the converted text to a First Word Plus file under a prompted chosen file name 1WP.DOC.FileName. It is possible to transfer such a file back into the Agenda but any transfer back to the Agenda has to be directly to the 'Y' drawer. Once there, the text has to be split back up into the original drawer names – a lengthy but simple task. To avoid it, I use a Ram-card as a backup for any setup files or names, addresses and phone numbers that I wish to remain in memory.

All in all, the Agenda is a very useful add-on to the Archimedes computer.

(Simon has kindly allowed us to put his Agenda transfer program on this month's program disc.

If anyone is interested in getting hold of an Agenda, one of the distributors we deal with stocks them, so we could see if we could get a good price. Let us know if you are interested. Ed.) A

Chess from David Pilling

Simon Burrows

David Pilling has recently started distributing a brand new multi-tasking version of the Chess program which he has been supplying for quite a while. The software has been completely rewritten to multi-task and the full C source code is supplied on the disc.

Starting

Clicking on the icon which is installed on the icon bar after loading opens up the large main chess window, the main feature of which is the very attractive looking chess board with clear and well designed pieces sitting ready for battle.

To the right of the board is a display showing elapsed time counters, move counters and details of the last moves of the player (you) and your opponent (the computer).

Playing

Moving the pieces is very simple – just click on the piece you wish to move (the border of the square starts to flash) and then click on the square to which you want the piece to move. If the move is legal, the piece moves. The computer makes its move when it has decided what to do.

Advanced moves such as 'castling' are allowed and are used by the computer as it plays.

The computer can play very well, and sometimes it takes a (short) while to decide on the best move. If you want to cheat, clicking on <select> when the computer is thinking, forces it to make up its mind immediately. Another feature which encourages cheating is that if you click on <adjust>, the last move made by either side is cancelled and using this you can go back as many moves as you like. The final feature which helps you is that the computer shows you what it thinks is the best reply to its moves, although you don't have to look at this if you don't want to.

The computer can be either colour, starting at the top or bottom of the board. It can be extremely difficult to beat (i.e. virtually impossible) if you want it to be. You can select ,from a menu, the depth of thinking that you will allow it – the number of moves ahead it can think (0-29) and also set it a time limit in which it has to make its move.

Multi-tasking

At any time you can push the window to one side or close it, and get on with something else. When you are ready, you can just resume play. You can also get the computer to beep when it has made its move.

Saving a game is simple, using the standard RISC-OS method of dragging an icon to a directory viewer

and a game can be printed out listing it move by move. It is possible to step back through the game using a control panel similar to that of a video recorder (i.e. play, stop, FF, REW, etc). If you want to set up a certain situation then it is easy to edit the board and move any of the pieces around, placing pieces anywhere you want. (This is also useful in a game to remove a troublesome enemy piece!).

A text file is supplied listing many of the well known moves, openings, etc such as the Four Knight's Game, Old Steinitz Defence, Queen's Gambit – as well as listing many of the games of the Old Masters.

Overall, it is a superb chess game, fully RISC-OS compatible, suitable for all ability levels and a pleasure for even occasional chess players to use because of its excellent design. A

Using the PC Emulator – Part 4

Richard Forster

There are some very pleasant aspects to the MS-DOS boot disc. One of them is the variety of different programs it contains – from minor utilities to fully fledged programs. The various items, as well as doing different things, do them in several different ways. Utilising this, we shall look at pipes this month, after first looking at ways to redirect file output.

There are, as you are probably aware, several different forms of output. The most obvious is to the screen, though it could just as easily be sent to a printer or indeed a file. The advantages of the latter two are easily seen, allowing data to be viewed and stored. To see the contents of a file on the screen we use the familiar command TYPE, its full syntax being:

```
TYPE [drive:]filename
```

There are various points to be borne in mind when using this command. If, for example, you use it on a binary file (one with an .EXE or .COM suffix), then you will probably see strange characters on the screen, including colour changes, form-feeds and even bells. The second detail, which is much more minor, is that tabs are taken to be 8 spaces wide. Very often files use this feature and, when viewing it on the Archimedes they may appear as "|I".

The text which is displayed by MSDOS is known as output and this can be redirected to a file by using the > symbol. By adding this symbol to the end of a command (and putting a filename after it), the output which would usually head towards the screen will instead go to the file. If we wanted to put a directory listing in a file we could type in:

```
DIR >cat.txt
```

Viewing it would be a simple matter of using the TYPE command:

```
TYPE cat.txt
```

There are however problems with using this, not least the fact that you cannot see what is going on. The other major problem is that if the file already exists it will be overwritten. As this can easily happen accidentally, the symbol is dangerous. Fortunately there is another, similar option – that of appending a file. By using a double symbol, >>, the new text will be stuck on the end of the old file or, if the file does not exist, it will be created.

As I have mentioned before, MSDOS is not as unuserfriendly (or user-unfriendly?) as is often made out. If a serious error does occur when the command is operating, it will often ignore the redirection and write directly to the screen.

As well as being able to direct output to a file, you can also direct input from a file. This is done by using the opposite symbol < and a filename, but it is not such a useful command. It can be used to save repetitive typing but it is far easier to use a batch file (which will be explained later).

Piping

Sometimes the output from a particular command is not exactly what we want. The original output has to be filtered before it reaches us, and this is known as 'piping'. There are three pipe programs included on the boot disc, two of which also have other uses. MORE.COM will allow text to be displayed with a pause at the end of evry page, FIND.EXE allows only text with certain patterns to be displayed and SORT.EXE puts all the lines into alphabetical order before.

Piping does unfortunately have a side effect. Its operation requires the creation of a temporary file in the current directory and so it will generate an error if the disc is full up or write protected. The pipe program uses this intermediate file to do all the data

manipulation. An upshot of this is that when using a pipe command you will occasionally encounter strange files, which will then vanish.

To use a pipe, you add a vertical bar (|) at the end of your command, followed by the name of the pipe and any parameters that it requires. MORE and SORT do not require any extra parameters but FIND does. If we wanted to view the current directory a page at a time (as opposed to using the /p parameter), we could type in:

```
DIR  | MORE
```

If you do this you will see what I mean about mysterious files. If you now just type in DIR you will see that they have vanished. You can use the directory command to test out the SORT command (again note the extra files) and the FIND command. The extra parameter needed by FIND is the data to search for between a set of speech marks.

```
DIR  | FIND "08"
```

would show you all the files saved in August and also any saved at 8, or 8 minutes past, or with an 08 in the filename. Multiple pipe commands can also be used, so you could set the machine to sort selected lines and display them page by page e.g.

```
DIR  | FIND "08" | SORT | MORE
```

Using FIND

As has already been mentioned, FIND and SORT can be used on their own as commands. FIND will search for a specific string of text in a file and SORT will arrange a file and save it as another file or display it on the screen. The basic syntax of the find command is simple:

```
FIND "string" [drive:][pathname]
```

If the required string happens to include speech marks, you must be careful to enclose the whole thing in them. FIND also has a number of optional switches which can be added to the command. /v will display lines NOT containing the required string and /n will precede each line with its line number in the file.

Using SORT

The syntax for SORT is also simple, being:

```
SORT <[drive:][pathname] >[output]
```

If output is omitted from the command then the display gets sent to the screen. As with FIND there are optional switches. Adding /r will do a reverse sort and /+n will sort the file according to the character in column n of the file. Note also, that sorting is done in terms of ASCII code, i.e. from "A" to "Z" then "a" to "z".

As you may have realised, the input file for both of the above commands is optional. If it is missed out, the command will expect input from the keyboard. After entering all the text a <ctrl-Z> will end the file. Alternatively, <F6> can be pressed to finish the file. It is perhaps worth testing this out on the sort command, entering a list of names and seeing the result.

Using the function keys

The use of <F6> to finish a file is an example of one of MSDOS's editing keys. When you are at the DOS prompt or inside some utilities, these keys become operational. The best way to see their function is to test them out in turn. Fortunately (or unfortunately, depending upon whether you need more editing power) there are not many, so the test does not take long.

At the DOS prompt, type in a line of random characters and press <return>. The disc will buzz as the computer looks to see if there is a file of that name and upon finding none (unless by some chance you have a file of that name), it will print an error message. You can safely ignore this, as this demonstration is simply showing the ways in which we can get the last line and manipulate it.

Pressing <F1> will copy the character from the last line, at the same cursor position, onto the present com-mand line. If you hold this down it will eventually copy the whole line. The usage of this, as with the other commands, is basically when you have typed in a command and either want it repeated without typing it in again or have made a mistake and want to correct it.

F2 is slightly more complex. By pressing it and then typing in a character on the keyboard, you will find all characters on the original line, from the cursor position to the character you selected, copied onto the present line.

F3 copies all the remaining characters, from the cursor position on the original line onwards, onto the command line. This is especially useful for repeating a command, as it simply requires the pressing of this key and <return>.

F4 is perhaps the hardest to understand. It "skips over" characters in the original line and places the imaginary cursor on a selected character (so its usage is as F2). Future use of these keys is effective from the new cursor position and is no longer the position on the old line, directly above the new one.

Using control codes

We have already encountered F6. It is the end of file marker and is used to finish off input into a file. It actually sends a <ctrl-Z> to the machine, which finishes off the file. There are four other control sequences which are useful, all of them used by pressing <ctrl> and the necessary letter. It must be noted that sometimes the commands will not work because of applications. <ctrl-C> and <ctrl-S> will also refuse to work if they are not the first thing pressed in a situation. This means if you are typing out a long file and press <ctrl-C> it will stop it, but if you have pressed a key and then try it, it will not do so.

<ctrl-C> is the most used of the four. It aborts the current command, rather like the ESCAPE key on the Archimedes.

<ctrl-H> has the same effect as delete (or rather backspace, as the delete key does not work in the PC mode) and so is rarely used.

<ctrl-P> is a toggle key i.e. one press activating and a second press deactivating. It sends output from the computer to a printer. Another way of sending data to the printer is pressing the key marked "PRINT" at the top right of the machine. This dumps the whole screen to the printer.

<ctrl-S> is a pause button. After being pressed, any other key will resume the flow. Thia is especially useful on long directory listings when you forget to add the MORE pipe, or the /p parameter.

Well that about wraps it up for this month. Next time we will have a look at EDLIN, the text editor supplied on the boot disc. A

First Word Plus Column

Stuart Bell

Firstly this month, Mark Flemming who has an Integrex ColourJet 132 printer, has no suitable driver for FWP. He does have drivers to dump sprites but not mixed text/ graphics in FWP. Can anyone help, please? I understand that a RISC-OS driver is available, but of course FWP doesn't use RISC-OS printer drivers. *(We have also had several requests for FWP drivers for PostScript printers. Any offers?)*

Whither FWP?

Paul finds that he has an overstock of First Word Plus and reduces the price in order to sell them, second hand copies appear more regularly in the 'Small Ads' section at about half the new price, and Computer Concepts announces 'Impression Junior' as the DTP-orientated word processing package which is the 'realistic alternative' to FWP. Having recently purchased Impression (and about to take up CC's offer of a free upgrade to Impression 2) I am faced with the question, "Whither FWP?"

I've sent my comments on Impression to Ian Lynch (Archive's DTP columnist) and won't duplicate them here. More pertinent to readers of this column may be my thoughts on whether or not to move over to Impression or one of the alternative DTP packages now available, leaving FWP on the shelf – or in the "Small Ads" section.

In favour of staying with FWP are: (i) familiarity – no re-learning to do (ii) footnotes – for large technical documents (iii) speed of output for simple text-printing (iv) simplicity of start-up and use for very simple documents (v) wide range of printer-drivers for non-standard printers (vi) the robustness of FWP compared with relatively new products like Impression – my version 1.03 does crash from time to time.

In favour of moving to Impression is: (i) power of DTP for finished document presentation, with all that that implies for multi-column text and graphics, different fonts and font sizes (ii) the excellent FWP-import facility which makes transfer painless (iii) the use of standard RISC-OS printer drivers, with a better chance of new printers being supported and far better graphics quality.

These lists aren't exhaustive but I think that they include the most significant pros and cons.

So what am I doing? I produce three kinds of documents. The first is those for my own personal use

(such as sermons – my real name is the Revd Stuart Bell!) The second is letters and the third is 'published' items such as newsletters. For the first two Impression has no real advantage over FWP and I'll stick with the latter if only on the grounds of familiarity. For the last type, Impression wins hands-down and I'm looking forward to 'playing' with it. For the new Archimedes user, however, familiarity is no benefit and the use of only one package gains on the grounds of minimising both confusion and cost.

I really do think that in the long term the writing is on the wall for FWP. The 'first Impression Junior and perhaps later Impression 2' upgrade path will be very attractive to most new Archimedes users and Acorn are going to find it increasingly difficult to sell FWP.

From initial specs, the other new DTP packages also seem wonderful, although if one of them makes a faltering start and fails to get a decent market share, long-term support and development might not be guaranteed. Impression's significant advantage over some other DTP packages is its use of virtual memory to store parts of long documents on disc. This even allows both Impression and !Paint to be multi-tasked on 1M machines (just). I'd be cautious of DTP systems without this facility.

Having said all this, if you use FWP for 'self-read documents' and letter-writing, and have no aspirations to producing newsletters and the like, there's no point wasting your money on new software. FWP is a stable and competent piece of software whose utility is in no way diminished simply because later all-singing all-dancing DTP systems are filling the advertising pages of Archive and its rival publications. In short, Impression, Tempest and Ovation are news, but good old FWP isn't.

So, although I'm staying with FWP, I've told Paul, on the grounds of wanting a change, that I'd like to put down my columnist's pen with effect from the end of volume 3. FWP2 is now so stable and well documented that most existing users' problems have been sorted out. Except for those who get FWP2 as part of the Learning Curve package (what a clever move from Acorn that was, in the light of Impression Junior et al) I can't see there being too many new FWP users. We shouldn't be worried that, as seems to have been the case with their DTP package, Acorn's own WP product has largely been overtaken by those of other suppliers. Rather, it's a sign that the Archimedes software market is getting stronger and stronger. And that's to all of our benefit.

To end, the usual reminder that I'm at 56 Crescent Drive North, Woodingdean, Brighton BN2 6SN (no phone calls, please) and would be glad to receive hints, problems, wishes and cries for help in time for my last column (ah!) by about the 15th August. A

Music Column

Stewart Watson

The main thrust of the mail I have been receiving recently suggests that there is a fair amount of doubt in many peoples minds as to how to expand their Midi system.

!Maestro

The Archimedes has an internal eight channel sound generator and comes supplied with !Maestro – a program which enables you to input and control music using the qwerty keyboard and the mouse. !Maestro is a reasonably satisfactory program and provides an introduction to music for those who have had little previous musical experience. For musicians, especially keyboard players, it is less useful, as most people want to enter their music in real time (play it as it is written) rather than one note at a time.

Interface

If you are to expand your music system the first thing you need is a Midi interface. These come in the form of podules and there are a number of them around, not all the same, so check for compatiblity with your software before parting with your money. You will also need two Midi leads which are straight wired 5 pin d.i.n. leads.

Software

Your other requirement at the computer end is software, the key programme in any Midi set up being the sequencer. The Archimedes is still very short on sequencers. EMR's Studio 24 Plus is still unchallenged at the moment, though Inspiration from Pandora and Rhapsody from Clare's should be available soon.

What equipment?

So far so good, but the problems really start when you look at the choice of music equipment. There is just so much to choose from but if you can identify what you need and what you are prepared to spend, you are less likely to be disappointed than if you go out and buy a £1000 synthesiser only to discover it is not what you wanted at all, despite what the salesman told you.

The questions you must answer are the following:-

1. Have I got my computer near my Hi-fi, or have I some other way of amplifying any sound generating equipment?
2. Do I want my music to be multi-timbral (different sounds for different parts)?
3. Do I want my music to sound professional e.g. the piano sounds like a piano, etc?
4. How much am I prepared to spend?

If you read the rest of this article and then go back and look at these questions again, you should have some idea of what you are in for, both musically and in terms of expense.

Controllers

Firstly you will need a controller, something to tell the computer which notes you are playing: this is usually a keyboard. All the major manufacturers are now also producing guitar controllers and wind controllers, so that guitarists, woodwind- and brass-players can choose a controller to suit their needs. Connect the Midi out of the controller to the Midi in of the Midi interface in the computer.

You then need something to produce the sounds. This could be the same keyboard as you use to input the sound or some other device like an expander. Connect the Midi out from the Midi interface in the computer to the Midi in of the sound making device.

The cheapest solution

The cheapest way into computer Midi music is to buy one of the Yamaha or Casio home keyboards. From as little as around £100 you can get a Midi keyboard that will start you on your way.

I doubt if a synthesiser, as compared with a home keyboard, is the right thing for most people to start with as most people don't wish to get involved with synthesis, and are quite happy to live with preset sounds. Even if you buy a synthesiser that is multi-timbral you will have the problem of sequencing all your accompaniments (bass part and drums) which is a problem most people can probably do well without, whereas on a home keyboard you get a whole selection of pre-programmed accompaniments.

My advice is to start with a keyboard (with midi of course) that is touch sensitive (the harder you press the keys the louder the notes, like a piano) and multi-timbral (can produce more than one sound at a time). Casio keyboards sound good – they're cheap but unfortunately they're not touch sensitive which means that your playing is all at the one level which tends to sound robotic. The CT 670 is the best of these at about £350.

Yamaha keyboards tend to be a little more expensive but they do produce touch sensitive, multi-timbral keyboards at a reasonable price. The best of their range is the PSR 4500 which fulfills all the criteria above for about £800. However, if you do not necessarily want the latest model, which are quite often only cosmetically different from the preceding models, if you look around you might be able to pick up cheap a PSR 6300 or DSR 2000. These two models were replaced by the PSR 4500 but both are excellent keyboards with all you need to get you started. You should be able to pick either of these up second-hand for less than £500.

Adding extra sounds

Once you have a keyboard, you might wish to add extra sounds. The cheapest way to do this, apart from using the internal sounds, is to buy an expander: a synthesiser without a keyboard. There are a myriad of these available now and once again, if you look around in the second-hand market you can pick up something like a Roland MT32 for approx £250.

Sampled sounds

If you want really realistic sounds you will need a sample player. These are like expanders except that the sounds are recreations of sampled sounds and are, on the whole, much more realistic in their imitations of real instruments. You can also buy sample players with a keyboard.

Summary

The cheapest way into Midi is an interface at between £50 and £120, 2 cables at £5 each and a small keyboard at around £120, not forgetting the sequencer

at approximately £100, making a total cost of around £300.

Starting with this system you could then add an expander, or sample player, at a later date and build your system up as you gain experience.

Pianists

For pianists, it is more important that they buy a keyboard that is touch sensitive, and will respond to the way they play, and also that they buy a sample player so that what they hear really does sound like a piano.

This will mean an outlay of about £500 at least. The cheapest keyboard and sample player is probably the Yamaha EMT 10 at around £250 but it is not multi-timbral, so you might be better to go for the AVS 10 which is three-part multi-timbral for less than £400.

Beware the manuals!

Whatever your preferred entry into the world of Midi and music, it is worth noting that the general standard of manual writing on the music side, is every bit as bad as on the computer side. A

ArcDFS from Dabs Press

Peter Jennings

Probably the first shock in upgrading to the Archimedes from a BBC-B or Master is finding just how different a machine it is: vastly bigger and more complex with, thankfully, a few familiar features to guide the newcomer along. The second shock may be realising how many other familiar features are no longer there. Cassettes are now useless, 5.25 inch floppies cannot be used without adding an extra disc drive and suitable interface, and DFS is no longer recognised.

Hopefully, any cherished programs on tape will long since have been transferred to disc and Master owners should already have copied any DFS programs to ADFS format. Even so, some DFS programs will not work on ADFS unless certain incompatible commands are changed.

More fortunate are former Compact owners who have been using 3.5 inch ADFS discs but almost everyone else upgrading will have to decide whether to abandon their existing discs or add a 5.25 inch drive. Until now, the next step has been to get one of the several available DFS readers and copy the programs to ADFS, editing the DFS-specific commands where necessary, or perhaps to transfer them with a serial link from a BBC micro if you were wealthy enough to have been able to keep your old machine as well.

Enter ArcDFS

ArcDFS, published by Dabs Press at £29.95, now offers the option of installing on the Archimedes a full BBC DFS system, compatible with earlier Acorn machines and working from the desktop. The software comes on a single 3.5 inch disc, with a well written and illustrated 40-page manual, in a plastic case. It runs on any Archimedes with RISC-OS and at least one megabyte of RAM, and will work with both 5.25 inch and 3.5 inch discs.

This enables DFS discs in Acorn, Watford or Solidisk, single or double density, formats to be read and written to. It will format either size disc for ADFS or any of the three DFS systems, 40 or 80 tracks, single or double sided and single or double density where applicable. It will not double step to read a 40 track disc on an 80 track non-switchable drive and I could not run the 80 track conversion program on a 40 track BBC Acorn User monthly disc.

ArcDFS does not claim to run Opus double density but I found it would catalogue a disc in this format. I managed to *type a text file but could not get BASIC programs to run.

ArcDFS in use

The disc is loaded from drive 0 to show two directory icons, !DFS and !Partition. Double clicking on the first adds a row of grey icons, representing disc drives, to the icon bar. If no additional floppy disc drives are configured, other than the original built-in ADFS drive, the new ones are numbered :2 and :0. If you have already added a 5.25 inch drive the new, grey, icons are numbered :3, :2, :1 and :0. They are in addition to any other disc drive icons already installed, including the yellow one of the built-in 3.5 inch drive, also numbered :0, and any external drive which may also be numbered :1.

This duplicating of disc drive numbers may seem confusing at first sight until you realise that the

numbers do refer to the same drives but for use as either ADFS or DFS drives. Drive 2, of course, refers to the second side of a DFS disc in drive 0 and drives 1 and 3 are the two sides of a disc in drive 1, as normal on the DFS system.

The situation does get slightly more confusing if you have more than two floppy disc drives. An ADFS drive numbered 2 becomes DFS drives 4 and 6 and an ADFS drive 3 becomes DFS drives 5 and 7. This seems to have been a possibility that Acorn did not consider. If you would prefer to use some other numbering, ArcDFS has a command to change the DFS drive numbers for any of the ADFS drives.

Options

Clicking <menu> over any DFS drive icon produces a menu offering a number of options, some with submenus. Most of these are the same as with ADFS, such as 'dismount', 'format' and 'backup'. Among them is 'name disc' but, although a useful identifier for your own purposes, the disc name is not used by DFS as part of a filepath, as it is with ADFS.

Pressing <f12> and typing *Help DFS produces the message: '*DFS selects the DFS as the current filing system', followed by a complete list of ArcDFS commands. These include all the usual DFS commands except *Compact.

Exploring new software this far is intuitive for most experienced computer users and it is a mark of any program's ease of use if a cursory examination of this type provides sufficient information to make it clear how the program will be used. ArcDFS lives up to this test and a quick exploration would probably give you the confidence to begin using it. But, like most worthwhile software, it provides far more facilities than can be deduced from this and a careful read of the manual is needed to get full use from it.

Clicking on a DFS drive icon puts a directory viewer of files on the screen, displayed as titles and blank white, square, boxes, as with ADFS files with no file type set. Pressing <f12> and typing *DFS (or *disc) followed by *drive n (where n is the drive number) and *. or *cat also catalogues the disc as normal.

Use with Solidisk discs

Solidisk double density discs, which have multiple catalogues, are shown in the directory viewer as a single catalogue with all files in alphabetical order. When catalogued with *cat they are shown grouped in their original directories. One disc which contained 151 files in six directories 'lost' all the files from the last directory and displayed only 144 files in the directory viewer, although all were shown by typing *cat. This suggests a limit to the number of files which can be shown on the desktop. If so, it should not cause too much problem as long as you are aware that the extra files exist on the disc as they can be run or otherwise accessed after pressing <f12>.

Running DFS programs

In fact, this may appear to be the only way to run any DFS programs on the Archimedes as there are no specific instructions in the manual, and clicking on the blank icons brings the error message you would expect from similarly unset files in ADFS. However, ArcDFS is a desktop system and if you go to the command line with <f12> you can *settype the files and they will receive the correct desktop icons and respond to double clicks from the mouse.

Either of the BBC emulators, 65Host or 65Tube, can be used with ArcDFS to increase compatibility. I found 65Tube easiest to use as this accepts nearly all the ArcDFS operating system commands. The current version of 65Host traps some common DFS commands so that BBC programs containing them will run in ADFS without crashing. These include *DISC, which is ignored, and *DRIVE which then selects the root directory on the appropriate drive in ADFS.

It is not very clear from the manual how to get round this and at first I was unable to access DFS drive 1 when using 65Host. However, an inquiry to Dabs Press brought a quick response – the command *DIR DFS::1.$ would do the trick.

Hints & Tips

There was also an additional tip that a similar command *DIR RAM: would allow access to an existing RAM disc from the emulator. The manual describes a series of commands for creating a new DFS RAM disc with a choice of tracks, densities and catalogues.

DFS files can be moved to ADFS by dragging between directories, either direct to a disc in another drive or onto a RAM disc first. They should then be given a file type, if they are to be run from the desktop, and any commands not recognised by ADFS changed or edited out.

Discs which have been given two catalogues – using Advanced Disc Toolkit or Disc Doctor – can have the second catalogue accessed by clicking on a 'swap cats' command on a sub-menu for the appropriate drive.

Another sub-menu provides 'Disc info', listing the number of tracks and sectors, whether single or double density and has single or multiple catalogues.

Discs can also be protected and unprotected from a sub-menu as an alternative to sticking tabs over the notches on 5.25 inch discs, or opening the slide on a 3.5 inch one (if you want to use this size for DFS).

In my early days as a disc-user with a BBC-B, I used to insert a control code at the start of a disc title so that the title appeared in colour when the disc was catalogued. This facility was lost when I upgraded to a Master but I was amused to see that my old discs had their title colour restored when catalogued in mode seven with ArcDFS.

The second application on the ArcDFS disc, !Partition, sets up a DFS area on an ADFS floppy or hard disc. Clicking on the icon produces a message asking which drive you want to use and this is shown on the icon bar with a 'v' after the drive number.

Conclusion

If you have only Acorn DFS discs, a simple, and cheaper, copying program is sufficient to transfer programs from one format to the other and at least one, by CJE, also copies from ADFS to DFS. However, there is nothing else as versatile as ArcDFS and it becomes essential if your DFS files are on non-standard double density or multiple catalogue discs. The program is effective and easy to use and is worth buying. A

"Herewith the Clues"

Richard Forster

It is very rare that you come across something which you can truly call original, especially in the computer world. If we look at computer games there are only really three categories – Arcade, Adventure and Strategy. Each obviously has different subgroups, shoot 'em ups, platform and ladder games etc... and the three categories are mixed freely.

As hard as I try, I am unable to clearly place "Herewith The Clues" in any of the above slots. It has aspects of adventure games in it, the genre of detective stories having been well picked, but it is definitely not an adventure game. It certainly comes nowhere near arcade, and only touches upon strategy in that you have to think.

Imagine a game in which you have access to every piece of information from the start. Nothing you do in the game reveals any more – and the only interaction is choosing which to view. While this sounds boring and tedious, it is surprisingly enjoyable. This is what the game does, solely using digitised pictures. In "Herewith the clues" the computer is used purely as a medium to give the information – the game could be presented in paper format and indeed was in the original of 1938.

The game comes in a sturdy box, picturing on the front cover the contents of the original 1938 dossier. This contained photographs, typed "reports", tickets and various other exhibits. The original also contained an envelope to be opened when "you have decided whom you would arrest for the murder of Serge Orloff". 'Actual Screenshots', who publish the program, have removed the temptation of glimpsing the answer by only supplying the solution when you write in with who you think did it – they also offer a prize to correct solutions.

The contents of the box are rather sparse – a card giving a brief history of how the original came into being, two discs (which contain about 1.5 Mbytes of compressed data) and an envelope addressed to you (or rather the Assistant Commissioner). Opening it, reveals a note from your superior telling you to "Click on what interests you." This completes the instructions – and although seeming incomplete it is actually all you need to know.

Cataloguing the first disc from the desktop allows you to load in the game. After a couple of seconds you are greeted by a digitised picture of a dossier, about to be cut open. I found this was a good place to adjust brightness and contrast levels. When I first played I was unable to make out some details and found this occurred because I usually have the two levels at very low settings. Raising them brought out a lot more detail because the blurring which occurred between the shades of darkness vanished.

Clicking anywhere on the picture reveals a picture of your desk. On the desk you can see various reports, a set of exhibits, some photographs, a pen and a cup of coffee. Clicking on the address of any of the documents allows you to read their contents – this gradually unveils, through four separate reports, the abortive attempt to capture sixteen terrorists. The reports are revealed page by page by clicking on the upturned page corner. The pen reveals signatures, which in turn reveal case histories and police notes, also accessible via a system of filing cards.

The first thing you notice when accessing either the photographs or the exhibits is a very clear voice asking you to insert the second disc. This is, in my opinion, the clearest piece of voice synthesis I have heard on an Archimedes. All the pictures of exhibits and the photographs are excellently digitised – this really is a game to show off some of the graphics power of the machine.

After examining all the pictures and text you can pause and drink the coffee on the desk. This reveals a picture with various sound effects. It is nice to see that they have tried to fill up the discs, using extra space for added pleasantries. After this brief sojourn it is time to work out 'who done it'. This is likely to take quite a while, trying to pick up a multitude of subtle and hidden bits of information, and then integrating them with other well concealed clues. With information to be gathered from reports and suspect histories to exhibits of cigarettes, tickets, bullets and even hair, this is no easy task.

I originally had a copy of this when it was in the paper format, though sadly I have long since lost it. The computer version is an excellent "conversion" and in no way makes the game less playable – if anything I rather enjoyed sitting back, idly selecting tit bits of information to digest. The mystery is ideally suited to this medium and having all the information at your fingertips in such an attractive format makes for an interesting and involved game.

In playing the game I only encountered one problem – installing it on the hard disc. The way Dune (the development system the game was designed on) presently works is by having data files (containing various cross referencing information) which unfortunately makes hard disc use difficult. Fortunately the game runs very fast from floppies and it was not a major setback. Having spoken to the people at 'Actual Screenshots', it seems the next version should have this problem corrected.

Overall, I would recommend the game to anybody, whether they are interested in detective stories or not. The game is far more satisfying than most and when you do finally settle down to trying to solve it you will have a lot of hard work ahead of you. The pictures are excellent with occasional effective sound and the system is a pleasure to interact with. I hope that this company decides to continue producing games for the Archimedes – especially ones as original and entertaining as this one.

"Herewith The Clues" costs £24.95 from Actual Screenshots or £23 from Archive. A

Man at Arms

Rob Wears

This impressive offering from 4th Dimension is an arcade/adventure game very similar to the Repton series which proved so popular on the BBC and Archimedes. It comes as a single disc in the usual CD box. The inlay card carries a screen shot from the game, an explanation of the scenario, loading instructions, key definitions and hints on how to survive. The disc is software protected but can be copied using the trusty Archive disc copier (a single copy for your own personal use only, please!).

The game is loaded by booting the disc with <shift-break>. It does not reconfigure your machine by itself but does require about 530k of free memory to load and run properly. The instructions suggest performing a power-up-delete reset if you have difficulty loading the game on a 1M machine. As might be expected, it is not multi-tasking but I think the number of clever people who would be able to play this game and think about wordprocessing at the same time must be extremely small.

Once the game is loaded, you are presented with a main menu which alternates with a high score table. This is accompanied by a rather catchy tune. At this stage you can select one of five tunes, OR the special sound effects for the game, OR switch the sound off

altogether. You will miss a lot of the flavour of the game if you choose not to select the sound effects!

The menu allows you to change from keyboard control to mouse or even joystick control or to redefine the keys used to control your movements during the game if you stick with the keyboard. There is no way of storing these changes but this is a trivial point. The default layout is sensible and well thought out. It is also possible at this stage to alter the sensitivity of the mouse and to vary the volume (using the usual 0-7 scale). Having completed your selection from the menu, you can begin the game in earnest.

You play the part of a warrior – armed with a sword and a limited(!) supply of a potion that makes you indestructible for short periods of time. You use these to travel round each one of four castles, collecting treasure and amassing points. Preventing you is an impressive collection of nasties (guards, snakes, poisonous plants and booby traps) and awkwardly placed piles of rock. Like Repton, the game has a good arcade feel and the scrolling is superb. The puzzles are ingenious and will keep you guessing for some time. There are enough of them to ensure a good lifespan of "playablility" for the game.

Unlike Repton, you are actually armed and can bash your way out of trouble if you're quick enough. Also unlike Repton, your progress is accompanied by a selection of sampled sounds – it can be really intriguing pushing a rock down a hole and hear it crashing down out of sight off the bottom of the screen. You will invariably find it blocking something vital if your luck is anything like mine!

Having collected a certain amount of treasure, you are said to have "taken" that castle and are given a password which allows you to move on to the next castle. The password will allow you to start at the new castle on all your subsequent games.

This game is a winner. It is not as large as the Repton series (only four castles as opposed to the ten-plus levels in each of the Repton games) and I have managed to get all the way through it, but it did take a considerable amount of time (and I think I can do better!). Man at Arms is different enough to stand the comparison with the early games. I found it thought provoking, addictive and completely entertaining. At £19.95 (£19 through Archive) it represents good value for money. A

Z88 to Archimedes Link

Malcolm Banthorpe

In the light of some of the recent advances in portable computing technology, Sir Clive's Z88 is beginning to show its age. Despite this, it has no really serious rival as a truly portable computer at a reasonable price. Its slim A4 size makes it small enough and light enough to carry around all day and its full-sized keyboard allows quite considerable amounts of typing without fatigue. The resident software, including Pipedream and BBC BASIC, makes it immediately useful without the need to buy extra programs. The screen width of over 100 characters goes a long way to compensate for the fact that there are only 8 lines of text.

Data vulnerability

One of its main weaknesses is that its principal form of file storage – ram packs – have no backup power. Therefore when the machine is used as a true portable – not connected to a mains adapter – memory retention relies totally on the four penlight cells which power the machine. As the size of the ram packs can be 32k, 128k or 512k, a lot of data can be at risk unless some form of backup is made regularly.

One of the three expansion slots also allows for eprom packs. Eproms are ideal for long term storage of fixed data but where files are frequently amended, an eprom is likely to fill up quickly since each time a file is resaved, its previous incarnation is deleted from the catalogue without the space it occupied being recovered.

The Z88 operating system is fairly robust and, even if it crashes, a soft reset will generally restore it without losing the files stored in ram. However it is almost inevitable, especially if you are writing and debugging your own programs, that a hard reset will be required at some time or other – losing all files in ram. Therefore, some form of external backup storage must be considered essential.

The need for file transfer

There are many other good reasons for transferring files to and from the Archimedes, including the use of a parallel printer (which would otherwise require

the purchase of a parallel interface on the Z88) and the fact that it is probably easier to develop and debug a BASIC program on the Archimedes and then transfer the final version to the Z88. If you have the Archimedes version of Pipedream, spreadsheets and databases can be transferred in either direction – otherwise Pipedream files can be transferred as plain text.

The product

The Z88 Link from Dudley Education Computer Centre is essentially a RISC-OS application which allows file transfer between a Z88 portable computer and an Archimedes without the need for any additional hardware at either end (although if you are using an A3000, you will need to have the serial port upgrade fitted) and without the need to install any additional software at the Z88 end.

The package consists of one unprotected disc, a user guide and an optional serial interface lead.

The program is installed on the Archimedes by double clicking on the !Z88-Arc application icon, which installs a Z88 icon on the left-hand portion of the icon bar, next to the hard and floppy drive(s). Clicking the menu button while the pointer is over the icon, brings up a menu allowing the baud rate to be set. This is set by default to 9600 which, according to the manual, is considered to be generally reliable. However, I found 2400 baud a better choice for 100% error-free transfer of long files. This appears to be feature of the Z88 (or at least the Z88/Archimedes combination that I have been using). The program uses Xon/Xoff protocol for file transfer but I have found that while using this and other transfer programs, errors occur fairly regularly at 9600 baud.

Transferring files

To transfer from the Archimedes to the Z88 is simply a matter of selecting the Import/Export application on the Z88 index, having first ensured that the baud rate, parity and Xon/Xoff are correctly set and then dragging a file onto the Z88 icon. If no filename has been entered on the Z88, the name of the original Archimedes file will be used and it will be saved on the default ram drive.

Sending files in the opposite direction is equally straightforward. Having selected the file to send from the Import/Export application on the Z88, a window immediately pops up on the Archimedes' screen containing the original file name (which can be changed if required) and an icon which can be dragged into your chosen directory viewer. By default, the filetype is Pipedream since, for many users, this will be the most commonly used Z88 application but a menu also allows BASIC, Diary, Printout and Text filetypes to be optionally set.

Files stored with either Diary or BASIC filetypes should be considered to be for backup purposes only, as they cannot be directly utilised on the Archimedes. Although the Z88 has BBC BASIC and even uses the same BASIC tokens as the Archimedes, the structure of each line is, for some reason, slightly different. This can be overcome in two different ways. Firstly, it is possible to modify the file to give the correct structure (a certain rival magazine has recently published a program to do just this) or perhaps – more usefully – the BASIC program can be converted to text form. This is easily achieved on either machine and on the Z88, a BASIC program in text form can be edited using PipeDream – the Z88 BASIC has no real editing facilities. All this is explained in greater detail in the User Guide.

Also on the disc is an application called !Spool-DTP which converts plain text files created by the Z88 into a form suitable for use in desktop publishing software such as Acorn DTP and Impression. The conversion is necessary owing to the fact that the Z88, when spooling text – along with most word processors – terminates each line with ASCII code 13 and each paragraph with a double code 13. This effectively prevents the desktop publishing software from reformatting the text. !Spool-DTP removes the end-of-line codes and replaces the double code-13 paragraph breaks with double code 10.

Finally, the disc contains several "Freeware" programs such as a magnifier, a mode converter and a BASIC compacter.

If you are a regular Z88 user then, as mentioned above, some form of file backup is essential. Other than filling up expensive eproms, a program like this is exactly what is needed as it makes file transfer a painless procedure. It would be nice, perhaps in a future version, to have the option to save your own choice of default baud rate and filetype in a configuration file to remove the need to set them each time the application is used.

The Z88-Archimedes Link costs £18 or £26 with the optional lead. The lead alone is available for £10 and a network licence costs £54. A

Fact-File

(The numbers in *italic* are fax numbers.)

4th Dimension	P.O. Box 4444, Sheffield. (0742–700661)
4mation	Linden Lea, Rock Park, Barnstaple, Devon, EX32 9AQ. (0271–45566)
Abacus Training	29 Okus Grove, Upper Stratton, Swindon, Wilts, SN2 6QA.
Acorn Computers Ltd	Fulbourn Road, Cherry Hinton, Cambridge, CB1 4JN. (0223–245200) *(–210685)*
Actual Screenshots	CRL, 7 Kings Yard, Carpenters Rd, London E15 2HD.
Aleph One Ltd	The Old Courthouse, Bottisham, Cambridge, CB5 9BA. (0223–811679) *(–812713)*
Apricote Studios (p4)	2 Purls Bridge Farm, Manea, Cambridgeshire, PE15 0ND. (035–478–432)
Atomwide Ltd (p24)	23 The Greenway, Orpington, Kent, BR5 2AY. (0689–38852)
Beebug	117 Hatfield Road, St Albans, Herts, AL1 4JS. (0727–40303) *(–60263)*
British Nuclear Forum	22 Buckingham Gate, London SW1E 6LB. (071–828–0116) *(–0110)*
Calderglen Computers	279 Keighley Road, Colne, Lancashire. (0282–866481)
Calligraph Ltd	53 Panton Street, Cambridge CB2 1HL. (0223–461143)
Cambridge International Software	8 Herbrand Street, London, WC1N 1HZ. (071–833–4023) *(071–837–6077)*
Chessfield Software	61 Chessfield Park, Little Chalfont, HP6 6RU.
Clares Micro Supplies	98 Middlewich Road, Rudheath, Northwich, Cheshire, CW9 7DA. (0606–48511) *(–48512)*
Colton Software (p23)	149-151 St Neots Road, Hardwick, Cambridge, CB3 7QJ. (0954–211472) *(–211607)*
Computer Concepts (p30/31)	Gaddesden Place, Hemel Hempstead, Herts, HP2 6EX. (0442–63933) (–231632)
Computerware	11 Livestock Market, Hall Road, Norwich. (0603–507799)
Dabs Press	22 Warwick Street, Prestwich, Manchester, M25 7HN. (061–773–8632) *(–8290)*
David Pilling	P.O.Box 22, Thornton Cleveleys, Blackpool, FY5 1LR
Dudley Education Computer Centre	Saltwells E.T.C., Bowling Green Road, Netherton, Dudley, DY2 9LY. (0384–634155)
Electronic Font Foundry	Bridge House, 18 Brockenhurst Road, Ascot, SL5 9DL. (0990–28698)
Ground Control	4 Alfreda Avenue, Hullbridge, Essex, SS5 6LT. (0702–230324)
HS Software	56, Hendrefolian Avenue, Sketty, Swansea, SA2 7NB. (0792–204519)
Ian Copestake Software	10 Frost Drive, Wirral, L61 4XL. (051–648–6287)
Lingenuity (Lindis)	P.O.Box 10, Halesworth, Suffolk, IP19 0DX. (0986–85–476) *(–460)*
Longman-Logotron	Dales Brewery, Gwydir Street, Cambridge, CB1 2LJ. (0223–323656) *(–460208)*
Morley Electronics	Morley House, Norham Road, North Shields, Tyne & Wear, NE29 7TY. (091–257–6355) *(–6373)*
Oak Computers (p32)	Cross Park House, Low Green, Rawdon, Leeds, LS19 6HA. (0532–502615) *(–506868)*
Pandora Technology Ltd	9 St Marks Place, London, W11 1NS. (071–221–9653) *(–9654)*
Protokote Ltd (p15)	Unit 5, Water Lane Trading Estate, Storrington, West Sussex, RH20 3DW. (0903–743358) *(–746325)*
Racing Car Computers	1 Mulberry Cottage, Tye Green, Elsenham, Bishop's Stortford, CM22 6DZ. (0279–812496)
Safesell Exhibitions (p16)	Market House, Cross Road, Tadworth, Surrey KT20 5SR.
Silicon Vision Ltd	Signal House, Lyon Road, Harrow, Middlesex, HA1 2AG. (081–422–2274)
SPEM	Via Aosta 86, 10154 Torino, Italy. (Fax 010–39–11–280009)
Superior Software	Regent House, Skinner Lane, Leeds, LS7 1AX. (0532–459453)
Techsoft UK Ltd (p12)	Old School Lane, Erryrs, Mold, Clwyd, CH7 4DA. (082–43318)
The Advisory Unit	Endymion Road, Hatfield Herts, AL10 8AU. (07072–65443)
USARC	Spuistraat 73, 1012 ST Amsterdam, The Netherlands. (+31-20-381534)
Watford Electronics	250 Lower High Street, Watford, WD1 2AN. (0923–37774) (0923–33642)
Wild Vision	15 Witney Way, Boldon Colliery, Tyne & Wear NE35 9PE. (091–519–1455) *(–1929)*
XFM Software	34 Buller Road, Longsight, Manchester M13 0PP. (061–225–5312)

Norwich Computer Services 18 Mile End Road, Norwich, NR4 7QY. (0603-507057) *(Fax 250095)*

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